Appendix A: Policies Considered by the New Buildings Committee

Incentives

- **Green Investment Fund** – City establishes a fund to incrementally fund energy performance improvements in new buildings. This could take the form of either a grant or a low interest loan program
- **Feebate** – A revenue neutral incentive/penalty program tied to energy efficiency requirements, such that those falling below the minimum would pay the fee, the fee would be waived for those just meeting the threshold, and owners choosing to exceed the minimum requirements would be eligible for a rebate.
- **Density Bonus** – Expand the scope of the existing downtown density bonus program (currently allows projects that meet defined criteria such as LEED Silver certification to build to greater heights and densities) to apply throughout the City, and require higher energy performance thresholds for participation.
- "**Priority Green Permitting"** – Expand on DPD's existing pilot program to provide facilitated and expedited permitting of projects targeting higher levels of energy performance. The program could also waive some permit fees for projects achieving the highest levels of performance.

Mandates

- **Mandatory Green Building Performance Standards** – Expand upon the current Green Building policy (all new municipal buildings larger than 5,000 square feet must achieve LEED Silver certification) to require that all new construction, in both the public and private sector, meet a Green Building performance standard such as LEED Gold (with additional energy credits) or Built Green 4-Star.
- **Building Code Updates** – Update the Seattle Building Code to align it with aggressive energy efficiency and sustainability goals and address all direct and indirect energy efficiency opportunities such as site development, water efficiency, indoor environmental quality, and renewable energy.
- **Energy Code Updates** – Go beyond the City's current commitment to exceed the WA State Energy Code for commercial buildings by 20% and create a next generation, performance based energy code (with an alternative prescriptive path) with embedded energy intensity or GHG targets. Could also incorporate post occupancy assessments for final verification of energy performance and code compliance.

In addition, input from stakeholders during Task Force meetings led to the identification of four more options to be considered:

- **Beyond Individual Buildings** – Improve building energy efficiency by looking beyond individual buildings to capture thermal energy from waste heat sources or connect multiple buildings together in neighborhood scale district energy networks.
- **Continuous Monitoring** – Properties would be audited after occupancy and disclose their actual energy performance in order to demonstrate compliance with energy mandates or incentive programs, rather than simply relying on design projections.
- **Raise Energy Rates** – Multi-tiered energy rates for both residential and commercial properties would be used to promote changes in behavior and

Appendix A: Policies Considered by the New Buildings Committee

reduce the impact of energy loads (e.g. plug loads, non-controlled lighting) that are not necessarily associated with the building itself.

- **Innovation Review Board** – Accelerate the rate of innovation by creating a non-adversarial permit review board with authority to approve new technologies and approaches that are not adequately addressed in the current codes or have not yet gone through the local testing needed to determine compliance.

Appendix B: Policies Considered by the Existing Buildings Committee

Measurement and Disclosure

Owners of existing residential and commercial buildings could be required to disclose specific energy efficiency information at various trigger points (e.g., time of sale, time of rental, date certain, etc.).

- **Building's Historical Energy Use:** Owners would be required to report utility data for a specified time frame (e.g., last 5 years). This data would be held in a public data base and could then be accessed by any investor to help inform purchasing decisions, the intent being that energy use becomes a market differentiator and drives investment in efficiency by current property owners.
- **Building Energy Performance:** Energy 'performance' may not be as vulnerable to individual behavior (e.g., one owner (a family of four) may be a much more intense energy user than a second owner (single adult) of the same property), and therefore may be a better indicator of overall efficiency of a property. Performance may be reported through either a prescriptive or performance-based approach and similarly held by the City for public access.
    - **Checklist:** Properties would be subject to a prescriptive checklist rating to determine their general energy performance. Checklist would include a set of the most common and cost effective measures which if implemented would achieve the desired level of energy performance and properties would be "rated" based on the number of measures achieved out of the total included on the list (e.g. a property would be rated a "4" if 4 out of 10 measures are present at the time of disclosure).
    - **Rating/Label:** Residential owners would be required to conduct a home energy audit and provide the results in terms of a Home Energy Rating System (HERS)-based label. There are a number of options for labels that could be utilized including Energy Star for Homes, a Home Energy Performance Certificate, or other HERS-based labels on the market. Commercial owners would be required to use a benchmarking or performance tool such as the EPA's Portfolio Manager.

Financing

- **Low Interest Loans:** The City could establish a partnership with local lenders to provide low interest loans to residential and/or commercial property owners for targeted energy efficiency upgrades. Low interest rate guaranteed either through volume (or by City Light buy-down). Loans could be 'guaranteed' by energy savings recouped over time.
- **Private Financing - Pool.** A pool of capital that private investors put together to provide a private loan fund for EE projects. The fund would be privately managed. Loan applications and repayment could happen in partnership with or independently of the City.
- **Energy Efficient Mortgages:** Owners would be guaranteed better terms (e.g. a lower interest rate) in exchange for investment in energy efficiency improvements as demonstrated by meeting a checklist or performance-based measure such as described under the Disclosure Mandates, below.
- **Public Financing – Pool.** Like the current Green Building Revolving Fund for city projects, a similar option could be made available for any property. For private sector customers, lien against property could be used as insurance.

Appendix B: Policies Considered by the Existing Buildings Committee

- **Energy Efficiency Local Improvement District:** Publicly issued bonds to provide low interest and assignable financing streams to home owner energy efficiency upgrades.
- **Revenue Bond issue:** Energy savings could be financed through a city bond issue with expected energy savings used for repayment, with program delivery provided by the City.

Innovative Repayment Mechanisms

- **Add on to property taxes:** The cost of upgrades could be added to property taxes at the time of sale, thereby ensuring that the efficiency savings stay with the property (and savings accrue to the current owner for the life of the measure(s) regardless of the number of times the property changes hands).
- **On-bill Financing:** City Light (or Seattle Public Utilities) could facilitate the financing (using public or private dollars) of efficiency upgrades on utility bills. Upgrades would be chosen such that the efficiency savings exceed the investment, such that consumers always see a savings in energy costs in their regular statements.

Incentives

- **Energy efficiency tax credits:** Owners who complete some designated level of energy efficiency upgrade would be eligible for a credit on their property taxes for the "lifetime" of the measure.
- **Carbon Feebate:** A "fee-bate" could be tied to either prescriptive or performance efficiency requirements, such that those falling below the minimum would pay a fee, the fee would be waived for those meeting the minimum threshold, and those owners exceeding minimum requirements would receive a rebate.

Upgrades

Owners would be required to complete certain energy efficiency upgrades at various trigger points. Similar to disclosure of performance data, upgrades could be mandated through either a prescriptive or performance approach.

- **Prescriptive Requirements:** Properties would be required to achieve a list of energy efficiency upgrades. These checklist requirements would be established to achieve a minimum level of cost-effective energy efficiency (roughly comparable to the 20% efficiency target). Owners implementing measures achieved beyond the minimum requirements could be eligible for additional incentives or rebates.
- **Performance Requirements:** Owners would be required to meet a minimum level of energy performance based on the chosen rating/labeling system (e.g. 20% better than baseline, "Energy Star," LEED-Silver, or some other rating equivalent to a 20% improvement). Similar to the prescriptive method, owners achieving higher than required ratings could be eligible for additional incentives, financing, etc.

Appendix C: New Building Policy Scorecards and Case Studies

Green Investment Fund

DESCRIPTION

The Green Investment Fund could offer various types of financial assistance to support the development of energy efficient buildings, including grants and low-interest loans. The primary intent of the grant financing option is to support early building and site-related project activities that examine the potential and identify the means to realize an exemplary, comprehensive green building project. The low-interest debt financing would serve a different purpose, namely to provide gap financing for projects seeking to attain high levels of energy efficiency. Either of these options can use base threshold building performance targets to qualify the application process, providing an incentive to stretch the market.

POLICY OBJECTIVE

The Green Investment Fund is intended to afford innovative developers the opportunity to create regionally relevant green building solutions that can serve as models for future development. The grantees tend to be developers that already have some experience or interest in green building, and are looking for the financial support to absorb some of the upfront capital costs associated with green building.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★	COST EFFECTIVENESS	★
ECONOMIC IMPACTS	★	ADMINISTRATIVE FEASIBILITY	★★★
COST OF IMPLEMENTATION	★★★★		

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL ★

Due to the limited reach of the Green Investment Fund model, there is limited impact on energy efficiency building practices across new development.

- **Limited potential for energy savings:** The overall impact of the green investment fund on energy efficiency potential is a function of the size of the fund – clearly, there is a direct relationship between the size of the grant/loan and the energy efficiency potential. Since there are monetary constraints on the size of the fund, the percentage of projected development that could be impacted by this fund is modest - approximately 16 projects per year at most (a $1.5 MM grant fund distributing 15 $100k grants per year and a $15MM loan fund originating, on average, 12 $1.25MM loans over the course of three years). In this scenario, the grant program would produce approximately 1500-2000 MWhr of energy savings annually (assuming a minimum threshold energy efficiency requirement of 40% above code for all projects), and the loan program would produce, on average, 450-650 MWhr of energy savings annually (assuming a minimum threshold energy efficiency requirement of 30% above code for all projects).
- **Policy biased towards developers already experienced with green building:** In the case of the grant option, it is likely that the fund would reward developers who are already incorporating green building strategies into their practices. In the case of the low-interest loan, this approach is biased towards those developers that would naturally seek alternative sources of funding. In either case, it is difficult to claim that the fund is the primary cause of energy efficiency improvements.
- **Easily mapped to 2030 Challenge targets:** The flexibility embedded in these funds allows for any range of energy performance targets to be incorporated into the funding strategy. It would be possible to map the threshold requirements with the series of incremental improvements in energy efficiency outlined in the 2030 Challenge. As already mentioned, the reach of this program is likely to be so limited that the impact would be quite small in absolute terms. There is clearly some public benefit to having publicized demonstration projects that have achieved high levels of energy efficiency, but the overall impact of such an approach is speculative.

ECONOMIC IMPACTS ★

There is limited potential for new job creation, but some positive economic impact could come from funding projects in lower-income neighborhood and business districts.

- **Very little impact on job market:** Due to the limited impact of this policy in terms of absolute number of projects, this policy has a negligible impact on job creation. The policy is not the type of market transformation tool that would generation new employment – it would support primarily existing green building professionals. Nor does the policy adversely impact development activity through project cost increases.
- **Lower-income areas could benefit from funded projects:** Strategically funding projects located in lower-income neighborhoods or business districts could boost real estate prices and generate demand for supporting retail or commercial businesses.

COST OF IMPLEMENTATION ★★★★

The costs of implementation are variable for the administering agency, and quite low for developers.

- **Cost to the City ranges from $500k-$2.5MM in the grant model, and $15-$20MM in the loan model:** The grant model is a direct public-private transaction, in which public funds go to finance a private venture, albeit one that provides a public benefit. This model requires funding from the City of Seattle, though the funding could be distributed across a number of different public agencies, as in the Portland Green Investment Fund model. The grant model would function with a relatively moderate amount of money provided, likely in the range of $500k to $2.5MM. The administrative cost is moderate, requiring only a portion of the time of 2-3 fulltime staff, though the application review process generally requires a technical advisory committee comprised of volunteers from relevant professional communities. The low-interest loan model requires a different approach. Once the fund is raised, typically on the order of $15-$20MM, it can function as a revolving commercial loan, in which the interest on outstanding loans pays for the overhead, and the constantly replenished principal is redistributed to new projects. There are also higher administrative costs with this option, as the loan underwriting process is more labor-intensive than a competitive grant application process.
- **Cost to developers of complying with minimum threshold standards for building performance is 2-3%:** Both the grant and the low-interest loan fund model allows for a simple application process, creating very few barriers to entry on the administrative side. The cost of changing development practices to incorporate more energy efficiency related strategies can be more costly, but is generally a product of developer experience. Estimates have shown that the basic level of energy performance needed to meet a threshold building performance equal to LEED® would result in a 2-3% premium on project cost. Both the grant and the loan model are intended to finance this incremental cost.

COST EFFECTIVENESS ★

The fund requires high capital costs for projected energy savings, and impacts only a targeted segment of the market.

- **High program costs per MWhr of energy reductions, approximately $1000/MWhr for the grant model and $1750/MWhr for the loan model:** There are very high costs per MWhr of energy conserved in both the grant and loan models. It should be noted that the grant model requires a yearly allocation of money from the city, whereas the loan model could be self-financing (loan interest would pay for employee salaries and administrative costs) after 5-8 years depending on loan interest and default rates. For this reason, the cost effectiveness measure can be misleading – the grant model cost effectiveness is calculated based on annual costs and energy savings, whereas the loan model cost effectiveness is calculated based on total startup costs and total energy savings through 2030.
- **Other potential benefits include strengthening business case for green building:** There are many potential benefits that the fund could generate, including strengthening the business case for green buildings through demonstration projects, and spurring the adoption of green building practices in developers who are exposed to successful projects.

ADMINISTRATIVE FEASIBILITY ★★★

The fund is a straightforward policy to implement, though, in the case of the grant, there are challenges in raising the fund and determining funding priorities, and, in the case of the loan, there are challenges in marketing the loan in a competitive real estate financing world.

- **Funding strategy for grant model requires collaboration among public agencies:** The Portland Office of Sustainable Development solved the problem of how to raise a fund of sufficient size to provide a grant of significant worth to the developer by collaborating with other public agencies, as well as a non-governmental agency. Through

creating a four-partner organization, each entity brought its own agenda, grant allocation priorities, and internal organizational politics. While there were many positive benefits to the collaboration, the process of administering the grant could, at times, be cumbersome. Conversely, a grant with only one source of funding may be administratively simpler, but could have more funding limitations.

- **Loan model draws on established practices, but can be difficult to market:** Loan underwriting is a longstanding industry practice that is simple to adapt to different circumstances or goals. Assessing project risk and determining the appropriate repayment schedule are standard practices for qualified professionals, and these criteria would govern the selection process for qualified projects. The administrative challenges for the loan model occur more in marketing the debt financing products. These financial instruments are more highly scrutinized than a grant because they compete with other sources of financing and they require a long-term financial relationship with the loan underwriting agency. It requires an aggressive and resourceful marketing team to get these products noticed in a market cluttered with financing options.

STAKEHOLDER IMPACT

- **Additional financing offset the expected project cost increases of 2-3%:** This allowed for developers to include innovative green building strategies and technologies that would otherwise have been removed from the project due to financing constraints and the unwillingness of the debt providers to finance "unproven" technologies.
- **The positive publicity for the awarded applicants resulted in increased interest from financiers and tenants:** Having a proven source of additional financing allowed developers to procure financing from institutions that would have otherwise considered the project too risky an investment. There was also increased interest from buyers and tenants that were seeking a proven green building product.
- **Potential benefit to susceptible communities:** It was suggested that the fund could strategically invest in projects that would have some social benefit. However this was not the primary focus of Portland or the Sustainable Energy Fund.
- **Good synergy with existing SCL/PSE policies, though some potential for redundancy:** A Green Investment Fund would have some interaction with existing Seattle City Light and Puget Sound Energy policies. Traditionally, both utilities have been interested in promoting innovation in energy efficiency practices that go beyond current energy code. Their programs are largely targeted to developers in order to align their financial interests such that incorporating strategies that achieve long-term energy savings are cost-effective. Likewise, the GIF is aimed at doing the same thing; it creates an incentive to innovate beyond the building performance thresholds in the RFP. Thus, the GIF and SCL/PSE programs would mostly like complement one another, though the issue of redundancy would have to be addressed in the program design and implementation.

LESSONS LEARNED

- A grant model works best with mid to small size projects (1,500-25,000 sf), as a modest grant of $50k-$100k can create many new opportunities for incorporating green building practices. A loan model works best for mid to large projects (25,000-100,000 sf) that are seeking gap financing of approximately $500k-$2MM for a specific part of the project (i.e. roof-top solar).
- Limited funds and the competitive application process result in a relatively small percentage of new development being impacted. Thus, the cost effectiveness of this policy is not on the order of mandate policies which have a much wider impact. The fund's real value, therefore, is in proving green building strategies and technologies before they are implemented at a higher level (i.e. through energy or building code).
- Having high building performance thresholds can limit the potential applicant pool for the policy and selects against smaller developers who cannot absorb the costs (i.e. energy modeling, sustainability consultant, LEED accredited professional) associated with compliance. In order to ensure that small projects are not priced out of the competing for financing, the fund should have flexible disclosure requirements on items that result in high costs.
- The loan program must have a targeted market niche. For instance, the loan could fill a market need in providing gap financing to projects that otherwise would elect to remove energy efficiency related components.
- It is difficult to promote debt financing products in a market full of different project financing options. The debt financing products must have low interest rates (prime or lower) and a loan repayment period longer than the financed project payback period (typically just the energy efficiency/renewable energy generation component of a building).
- The fund model provides a great opportunity to strengthen the case for green building in the Seattle region by selecting and publicizing exemplar projects for the developer community to learn from. The fund should follow up with projects to track their building and financial performance, in order to form a database of exemplary projects.
- Providing project financing for new construction versus existing buildings requires different program capacities and policy targets. It is not that recommended the one fund program serve both markets.

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CASE STUDY: SUSTAINABLE ENERGY FUND

1. THE POLICY

In 1999, the Pennsylvania Utilities Commission (PUC) created the Sustainable Energy Fund (SEF), a private, nonprofit, financial organization. This fund awarded grants and offered low-interest debt financing to energy efficiency and renewable energy related projects. This fund was generated through a society benefit fee of several cents added to ratepayers' utility bills. From 1999-2006, this fund distributed approximately $1.5MM - $4MM annually to over 70 projects.

In 2006, the PUC terminated the society benefit charge, and the SEF was left to work with the remaining money in the fund (approximately $13MM), which was put into an endowment. The SEF maintained the same mandate of promoting energy efficiency and renewable energy generation; though it has a narrower market focus, primarily LEED® buildings and green building technologies. The product that SEF offers is considered gap financing, or rather a low-interest loan for energy-related projects to established commercial, industrial, municipal, and nonprofit entities in eastern and central Pennsylvania. The minimum loan amount is $10,000; the maximum loan amount is $1,000,000. SEF debt financing products typically have loan rates that are competitive with commercial banks and flexible loan collateral requirements.

SEF general project types are:

- Energy Efficiency/Energy Conservation Projects – that save electricity or other energy, particularly projects with a LEED® or green building technology component.
- Renewable Energy projects which draw power from naturally replenished sources. These may include solar power, wind power, geothermal power, or power generated from biomass sources.
- Clean Energy Projects that develop clean energy technology and processes that have minimal impacts on the environment, such as distributed generation projects.

As long as the project: (a) reduces energy consumption; (b) replaces a fossil fuel with a clean (or cleaner) energy source; or (c) produces clean energy (e.g. from renewable sources); then SEF will consider financing the project. SEF will also consider funding or co-funding the energy-portion of a new building construction or a building remodeling project, particularly those projects seeking LEED® certification.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Program Uptake

Each year, SEF aims to originate between $1MM and $4MM of low-interest loans to 2 – 4 projects. One of its fundamental criteria is that the loan financing enable the energy efficiency/onsite renewable energy generation component to occur. Projects that are already sufficiently financed to incorporate green building technologies are given lower priority than those that would have to remove energy efficiency components without SEF funding. This "but-for financing" approach typically places SEF as the final piece of the financial package, and ensures that SEF funding is the direct cause of energy efficiency improvements in the buildings that it finances. This criteria has limited the number of projects interested in SEF funding, though there is not ample data to support the claim that the criteria is prohibitively strict.

2.2. Energy Savings Potential

The SEF does not have any base threshold of building performance in order to qualify for their loans. Each project is reviewed on a case-by-case basis, and qualifies if it meets the basic criteria of promoting energy efficiency or onsite renewable energy generation. SEF does require that the energy savings or energy production be documented as a condition of the loan. Nonetheless, the energy savings potential of this fund is low due to the narrowness of its impact and the highly variable standard of energy performance to which SEF holds its projects.

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3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

In its current form, SEF has no program cost born by the City. However, SEF has somewhat unique roots as an NGO. Originally, the fund was generated through the society benefit charge, a small surcharge on utility bills. Once this funding was cut, the SEF created an endowment and now deploys its capital through low-interest loans.

The administrative cost is $800k annually (which includes $100k of operating expenses and $700k of staff salaries) and is funded, in part, through the interest payments on outstanding loans. As repayments will vary from year to year, the SEF must occasionally draw money from the endowment to pay expenses.

3.2. Cost to the Developer

Unlike a traditional commercial bank, SEF can be quite creative in structuring loan financing solutions to meet the unique requirements of each project. For example:

- SEF will finance 100% of the green building element of the project, and no out-of-pocket payments are required from the developer during the construction phase of the project.
- No loan payment is required until several months after the project is completed. By that time the energy savings from the project show up in developer's utility bills, freeing-up cash from the developer's operating budget to use for the loan payments.
- Loan payments are customized for each project to be less than the monthly energy savings, thus there is no increase to the existing operating budget, and in many cases, a net positive cash flow.
- SEF can structure the deal to fit a developer's current and future cash flow needs – including extended no-payment periods, interest-only payments for a year or more, short-term bridge loans, etc.
- Unlike many commercial banks, there never is a prepayment penalty with any SEF loans. Banks generally will require a prepayment penalty on fixed-rate loans to generate income in the event of loan prepayment. By contrast, SEF wants to help implement energy projects quickly.
- SEF will accept a higher risk position on collateral than most banks.
- For large projects, many banks do not want to finance the last 10-20% of a project. By contrast, SEF can provide that final gap financing piece to make the project happen.

Aside from the financial benefits of the highly tailored loan underwriting and structuring program, the actual cost of application is minimal, confirmed by Shazaam Realty. The application process generally requires information that any typical developer would already have at hand to apply for debt financing.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The Sustainable Energy Fund is comprised of seven fulltime employees that fulfill marketing, administrative, and loan underwriting roles. The organization has ties with the Pennsylvania Utilities Commission and PPL Public Utilities, but essentially runs the fund independent of other organizations.

4.2. Ease of Initiation

The SEF developed a good track record of working with developers from 1999-2006 when it was still funded through the society benefit charge. Thus, it had a substantial amount of momentum when it entered into its current working model as an endowment making primarily low-interest loans. The fund was capitalized with the remainder of the fund, and SEF was tasked with developing a strategy for deploying its capital. One key obstacle was that, in the new model, SEF had very limited grants offerings, historically a very attractive financing option for developers. Additionally, the loans were at times with a higher interest rate than market rate. This resulted in

waning developer interest in partnering with SEF. To remedy the situation, SEF is currently in the process of unveiling a new regime of programs and financial products that are designed to fill an identified market need – gap financing for the energy efficiency components of LEED® buildings.

4.3. Funding Requirements

The endowment currently stands at just under $16MM, which is managed as a revolving commercial loan fund, distributing approximately $1MM to $4MM annually. The amount distributed in low-interest loans is entirely dependent on the quality of applying projects. The target for 2008 is $3.5MM of deployed capital. The interest payments are generally used to pay the overhead of the office and staff, though they can dip into the endowment principal if need be.

4.4. Educational Outreach Requirements

Since SEF took its current form, it has had difficulty in attracting the level of interest in its funds that the president and staff would like. Part of its struggle can be attributed to a widespread downturn in real estate development in Pennsylvania. However, according to developers, the primary obstacle for the SEF concerns marketing efforts and product offerings. Though marketing is a significant budget item for SEF ($100k annually), it has been challenging to devise strategies that market effectively to a diffuse developer community. Consequently, it has been necessary for SEF to partner with other organizations such as trade groups (e.g. installers) or real estate services organizations to spread the message of their fund. This approach, however, has not borne impressive results thus far in terms of generating developer interest in the SEF. In terms of product offerings, the commercial loans that SEF currently offers are unique to real estate financing in terms of their underwriting and loan structure. Further educational campaigns and materials could help attract more developer interest and assuage their concerns over pursuing alternative financing options.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

Developers who have received SEF funding are quite enthusiastic about the program. This group of developers is quite small, however, due to relatively short time of the program's existence and the difficulties that SEF has experienced in educating the developer community concerning its programs. According to Shazaam Realty, there are a range of benefits of accepting SEF funding, including: accessing the additional funding for energy efficiency related building components; the publicity benefits; and the easy application. In one Shazaam Realty project, 345 Market Street in Kingston, Pennsylvania, the developer claimed that having SEF funding was critical to his application for financing from national banks. Additionally, the SEF brand framed the project as one that was providing a public benefit, which generated interest and support from both private financiers and government agencies. The only drawbacks cited were related to the competitiveness of the loan interest rates, which were often higher than those offered by local banks. In the case of the aforementioned project, even with a relatively high interest rate on the loan, the returns on that investment were well worth it, in terms of access to additional financing and public interest (and for potential future projects). In the most recent product offerings, SEF has lowered the loan interest rate to prime or below prime rates.

6. REFERENCES

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CASE STUDY: PORTLAND GREEN INVESTMENT FUND

1. THE POLICY

The Green Investment Fund (GIF) emerged from an effort headed by the Portland Office of Sustainable Development in 2001 to aid green building early adopters in the process of improving the performance of their buildings. By 2004, over 70 projects had been granted funds, with grant sizes ranging from $3,000 to $70,000 (the majority of the grants were between $5,000 and $10,000) in four categories: single-family, multi-family, commercial, and innovation. The grants were awarded to projects that exhibited a wide range of innovative green building practices from energy efficiency and on-site renewable energy generation to water harvesting and recapture.

In 2004, the GIF expanded to its current form, which includes other partnering agencies and organizations – the Portland Bureau of Environmental Services, the Portland Water Bureau, and the Energy Trust of Oregon, Inc. Each partner contributes annually to the fund and oversees project selection and fund allocation. The primary intent of the GIF is to support early building and site-related project activities that examine the potential of and identify the means to realize an exemplary, comprehensive green building project. GIF grants are secondarily intended to help offset the incremental hard costs of the green building measures or strategies that most strongly contribute to the building's ability to meet the GIF goals and strategies (see section 2.2). The key focus of the strategies change each year.

The GIF is a competitive grant program that supports innovative green building projects in Portland. In the current round of funding, a total of $425,000 is available, and the maximum grant amount for any project is $425,000. Industrial, multi-family residential, commercial, and mixed-use public and private organizations qualify. Grants are available to projects irrespective of other supplementary financing sources, and are considered taxable.

The first payment amount is unrestricted and must apply to conceptual and schematic design activities that identify green building and site measures that facilitate the realization of the GIF's goals and strategies. The second and third payment will be a split of the remaining grant amount and apply to the costs of the green building and site measures identified through conceptual and schematic design activities.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

Since 2004, the GIF has granted funds to 33 projects, roughly 5 to 8 projects per year. The monetary limitations of the fund and the stringency of the threshold requirements place a limit on the number of projects that could benefit from the program each year. Nonetheless, these projects serve as models for the development community and demonstrate the economic feasibility of innovative technologies and design strategies.

Year	Number of Proposals	Total $ Requested	Projects Selected	Commercial (+ multi-family)	Residential	Other
2005	33	~ $2 million	13	6	3	4
2006	31	~ $4 million	6	3	3	
2007	39	~ $5 million	6	4	2	
2008	22	> $5 million	7	7		

In the application process, each project is assessed and ranked by the technical advisory committee (architects, designers, and energy and water experts independent of the funding organizations). The top ranked projects are then reviewed by representatives from each partner organization and grant amounts are determined according to the internal criteria of each organization. In 2007-2008 GIF attracted more office towers than ever before, most likely due to the fact that the cap on total funding was removed (i.e. a project could get the full $425,000). However, the grants were allocated over seven projects, not just one. The GIF found that when single-family residential projects were allowed to apply (2005-2007), the applicants typically ask for less money (and

receive less) than the multifamily/commercial projects.

2.2. Energy Savings Potential

Criteria – Performance Thresholds to Qualify for Application Review

Energy efficiency and on-site renewable power generation:

1. Implement integrated design strategies that will maximize energy efficiency and overall building performance, and implement on-site renewable power generation for the remaining load.
2. Install monitoring and verification equipment or an energy management system that will facilitate ongoing energy performance and maintenance over the building's lifetime.

Performance targets and preferred strategies:

1. Increase building performance beyond the Oregon Energy Code by 60%.
2. Install on-site renewable power generation for at least 12% of the remaining electricity load after implementing available energy efficiency strategies and technologies. Calculate renewable generation as a percentage of total energy load.

Energy efficiency calculation:

1. Calculate the baseline energy load and occupancy demands for stated daily hours of operation and expected number of occupants. This calculation may include equipment such as servers, computers, office equipment, HVAC, windows, insulation, and all other factors that impact load. Include the use and impact of equipment controls and occupancy sensors.
2. Calculate efficiency of installed equipment against the baseline. State rated energy efficiency of installed equipment and materials, such as the U-value of windows, R-value of insulation, etc.

There are additional performance thresholds in: (1) materials efficiency, recycling and durability; (2) stormwater management and improvement in watershed health; and (3) water conservation and efficiency.

The current energy savings performance threshold states that the building must go well beyond the current Code. Given the fact that only a limited number of projects are awarded each year, the overall energy savings for the city is quite small. There is some emphasis placed on the strategic location of grantees, in order to catalyze green building in targeted areas of the city. Any evidence of this actually occurring is anecdotal at this point.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

The GIF has a 5-year lifespan with a total budget of $2.5 MM. Each year was allocated $500,000, $425,000 of which would be used for grants, $50,000 (10%) for administration and $25,000 (5%) monitoring by the Portland Office of Sustainable Development. Three government agencies – the Portland Office of Sustainable Development, the Portland Bureau of Environmental Services, and the Portland Water Bureau – share the City's program cost burden (70% of the total), while a non-profit organization, the Energy Trust of Oregon, Inc., contributes the other 30% of the yearly program cost.

3.2. Cost to the Developer

According to developer Kevin Cavenaugh, the administrative cost of applying for the GIF is quite minimal, and there is no post-development monitoring program assessing the actual building performance. The cost of complying with the current building performance thresholds are unmeasured, though expected cost premiums are estimated at 3% of project costs.

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4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The GIF is administered by the Portland Office of Sustainable Development. There are two staff members that dedicate a portion of their time to the fund year-round. The coordinator of the program estimates that 10-15% of her time goes toward administering the GIF, and the business manager who oversees the payments estimates that 20% of his time goes toward the GIF, with heavier workloads during the application review period, During the application review cycle a technical advisory committee, comprised of developers, architects, engineers, builders, green building consultants and community activists, is used to assess each application.

4.2. Ease of Initiation

Since the GIF is a four-organization partnership, the process of initiation requires a significant amount of collaboration across organizations to determine the program targets and minimum thresholds of building performance to qualify. Due to the fact that the GIF was initiated as a 5-year program allowed for a limited commitment of the partner organizations, both in time and money.

4.3. Funding Requirements

The GIF is jointly funded by the Portland Office of Sustainable Development, the Bureau of Environmental Services, the Water Bureau, and the Energy Trust of Oregon, Inc.

Organization	Annual Funding Contribution
Portland Office of Sustainable Development	$50,000
Portland Bureau of Environmental Services	$225,000
Portland Water Bureau	$75,000
Energy Trust of Oregon, Inc. (NGO)	$150,000

4.4. Educational Outreach Requirements

The educational outreach requirements are minimal. A press release is issued each year announcing the start of the application process.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

According to the Portland Office of Sustainable Development, the developer community is quite enthusiastic about the GIF. The access to additional funding, the publicity benefits, and the easy application process were cited as primary reasons for their support. The only drawbacks are that the process is highly competitive, and project selection and grant funding allocation can be contested. As the Portland Office of Sustainable Development reiterated a number of times, there are always more qualified projects than available funding. Nonetheless, some developers have had the fortune of being awarded multiple grants for different projects.

Local designer-developer Kevin Cavenaugh states that there is a large incentive to innovate in the areas prescribed by the GIF each year. There has been some pushback, however, on the issue of tying grant qualifications to building performance metrics that require large upfront costs in modeling and consulting fees. This would bias the grant toward large projects, which ultimately would benefit less from the modest grants available to them. Even with potential extra costs, there are ample financial rewards for receiving a GIF grant, namely in the positive publicity, higher absorption, and potential lease premiums.

6. REFERENCES

Alisa Kane, Portland Office of Sustainable Development

Kevin Cavenaugh, Developer, Burnside Rocket

Green Building Feebate

DESCRIPTION

The Green Building Feebate program would function as follows: a fee would be charged for all new construction based on the square footage of the building. A waiver would be obtained if the building meets certain green building standards. A reward would be granted for high performance buildings, the reward incrementally increasing according to the level of certifiable performance that the building achieves. The program would affect buildings over a predetermined size, for example: 5,000 sf for commercial, and over 1,200 sf for residential.

POLICY OBJECTIVE

The objective of the Green Building Feebate policy is to catalyze a widespread market shift to green building practices. As the policy is tied to green building practices, it can be used to create incentives for a wide range of building performance improvements, but most easily for standard quantifiable metrics such as energy performance.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★★★	COST EFFECTIVENESS	★★★
ECONOMIC BENEFIT	★★★	ADMINISTRATIVE FEASIBILITY	★★★
COST OF IMPLEMENTATION	★★★		

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL ★★★

Long-term energy savings potential is high if the magnitude of the fee encourages adoption of energy efficient building practices.

- **Policy uptake is dependent on fee price point:** The policy example in Portland as not yet been implemented. Portland is assuming a base case of 75% pay fee / 20% fee waiver / 5% reward; while the optimal case shows: 30% pay fee / 50% fee waiver / 20% reward.
- **Cumulative energy savings of 150,000 to 300,000 MWhr through 2030:** Energy savings were calculated assuming an energy efficiency improvement of 30% for waivers and 45% for rewards (based on the Portland model) for the various policy adoption scenarios. Policy uptake will determine the energy savings potential of the policy – the baseline scenario of 25% adoption will result in the lower range of energy savings, and the high adoption scenario of 70% will maximize the energy savings. The critical piece of the policy design is with the price point and the level of performance required. The policy uptake will be affected by the Seattle's ability to define the appropriate fee/reward threshold.
- **Consistent with targets outlined in 2030 Challenge targets:** The policy is most effective when tied to a 3rd party certification such as LEED. This standard currently does not prescribe improvements in energy efficiency and carbon reductions to the level necessary to achieve the 2030 Challenge. It is necessary to add mandatory credits within the Energy and Atmosphere section of LEED-NC 2.2 to achieve required building energy performance (the 2 mandatory credits prescribed by LEED match Seattle's current Energy Code). Portland also prescribed a review process to update the policy every three years as the referenced standards and policies are upgraded. A similar periodic review will be critical for this policy to be successful in Seattle. The policy is still an incentive based program, which cannot compel developers to meet the chosen energy performance standards. However, setting the fee and reward at an appropriate level should stimulate developers to adopt more energy efficient construction. Therefore, monitoring of policy adoption over time will be key to assessing the policy's compatibility with a route map of energy performance improvements over time.

ECONOMIC IMPACTS ★★★

Potential for job creation and regional economic development is dependent on fee level and policy uptake.

- **Job creation potential dependent on policy uptake:** If the fee/reward is large enough, the feebate policy would promote a market-wide shift to green building design and construction strategies. This would likely generate new jobs in the following sectors: sustainability consultants (especially LEED certified professionals), green collar jobs in

materials and technology manufacturing, commissioning professionals, appraisal professionals, among others. The potential for this policy to generate new green collar jobs is dependent on the size of the fee and the market reaction to the standards.

- **High potential for policy to aid in regional economic development in long-term**: High to medium policy uptake (35-70% of new development receiving a waiver or reward) would catalyze the green building professional job market, resulting in new jobs for building permitting professionals, contractors, trade professionals, lenders, and appraisers.
- **In the short term, potential for project cost increases is high, which could stagnate real estate development market**: The fee level which would trigger incorporation of green building practices is variable across development type and developer. Even if the fee is appropriately set to reflect the difference between costs and benefits, it is inevitable that some projects will not elect to pursue the waiver/reward. If this phenomenon is widespread (adoption is low), then lease rates, rental rates, and sale prices may rise, potentially causing stagnation in the market. Therefore, the fee structure must be tightly aligned with the increase in development costs associated with high performance buildings.

COST OF IMPLEMENTATION ★★★

The policy development process could be quite costly, both in terms of time and money. However, once set up, this policy is expected to have moderate to low costs for the City, and will add only slightly to project costs for the developers looking to achieve the waiver level. The reward level may incur more costs depending on the approach of the developer.

- **Policy will require start-up costs, but will generate revenue for the City under most adoption scenarios:** In Portland, $500k has been assumed for technical assistance and administration for the fee. For Seattle, these program costs will be in the range of $750k, as the absolute projected growth of the City is larger than Portland's. The City will generate funds from those projects assigned a fee for non-compliance, in the range of $4.5-$6MM annually for the low adoption scenario and $600k-900k annually for the high adoption scenario (assuming an average $2.00/sf fee for commercial and $0.75/sf for residential). One key issue for Seattle to assess is the level of market adoption that particular fee rates could support, or rather, at what point is the City distributing more money in rewards than it is receiving in fees.
- **Fee will result in project cost increases for developer, though waiver and reward will offset incremental costs of development:** The intent of the policy is for the fee to equate to the incremental cost increase in green building (the difference between marginal cost and benefit of green building). For those projects that do not comply, the fees would represent a small, but noteworthy, percent of total project cost (<1-4%). An economic consulting group, ECONorthwest, performed an economic assessment for the City of Portland, which assumed that a 1% cost premium would be necessary for the waiver, and a 2-3% cost premium for the reward. These figures are a good estimate for Seattle.
- **Need for contextual business case:** The perception of developers is that this is a de facto mandate policy, which essentially requires compliance. To assuage concerns over additional project costs, it is suggested that Seattle develop a solid business case for green building in their regional context with well documented case studies of successful projects to convince those in the real estate community of its feasibility outside of government and large commercial buildings.

COST EFFECTIVENESS ★★★

Energy savings per program cost could be substantial if the policy is designed to send the correct price signal to developers.

- **Program cost per energy savings - $60-$110/MWhr:** Assuming a $2.00/sf average fee/reward for commercial buildings and $0.75/sf for residential buildings, cost effectiveness ranges from $60-$110/MWhr. This does not take into account the revenue generating capacity of the policy, which in all but the highest policy adoption scenario would generate a positive cash flow for the program. In the highest adoption scenario (70%), the cost effectiveness is approximately $10-$15/MWhr taking into account total program costs and revenues. As Portland has not implemented the green building feebate policy, there is no track record of possible policy adoption or the performance of their fee/reward design. The energy performance is directly correlated to the third party standards that the feebate uses. If the feebate policy is quite ambitious and requires that new developer adhere to a high level of LEED® certification, then the energy savings per program cost could be quite low compared to other incentive policies.

ADMINISTRATIVE FEASIBILITY ★★★

Administration of the policy would require resources from the City in order to educate and train not only the developers and homebuilders, but also appraisers, lenders, trade groups, and labor unions. City staff would also need to be trained to understand the technical requirements of the policy.

- **Some difficulties in initiating policy:** In the case of Portland, the policy required a good deal of consultation and negotiation in order to make the policy politically feasible. Thus, the policy development phase proved to be challenging, but it is hoped that this upfront effort will smooth way for a relatively conflict-free implementation.
- **Good program flexibility if tied to 3rd party certification:** The feebate policy can be designed to be adaptive to the changes in standards to which it is referring - LEED® and Earth Advantage. Consequently, the policy is tied to a 3-year review cycle to keep the policy updated to contemporary standards.
- **Significant educational outreach requirements:** An outreach program would be required to ensure the development community understood how the feebate was going to work, how it had been structured and what information would be required to ensure compliance. Some monitoring of the development process will be required to ensure that the required performance (e.g. in terms of LEED®) is achieved.
- **Policy could integrate well into existing permitting process, though additional training may be needed:** There are staff within DPD with the requisite skills to implement the policy, although some training on third party certification for the permitting staff may be required, specifically LEED® and Earth Advantage. It is not known if additional staff solely dedicated to this program will be needed, beyond a program coordinator. It is possible that the policy will add significantly to processing time, both for permitting and fee collection/reward distribution. If that is the case, then additional staff will be needed.
- **Possible legal challenges:** There are potential legal issues surrounding the implementation of this policy. One strategy that contending groups could employ are suits against the City for placing undue financial burden on them to comply with green building standards. Additionally, there are rules and restrictions on what the City is permitted to charge a fee for. If Seattle elected to pursue this policy, it would have to investigate the legal implications of a green building feebate.

STAKEHOLDER IMPACT

If the threshold levels are set to offset most additional costs, and sufficient advice provided to facilitate developers implementing higher performance buildings, the impact on the development community will not be too onerous. It would fit well within the current regulatory regime.

- **Potential small homebuilder community concern:** In Portland, the City found that initial outreach to residential developers and trade groups was necessary to develop understanding regarding the threshold targets for the feebate and its potential impact on their costs. Developers in the commercial and large retail markets were more supportive due to the already high prevalence of LEED® certified buildings in Portland.
- **Engagement with the real estate community:** Seattle should engage with business alliances and building owners associations to understand their perception and concerns about this type of policy. Additionally, it is recommended that the City develop a solid business case for green building in their regional context with well documented case studies of successful projects to convince those in the real estate community of its feasibility outside of government and large commercial buildings.
- **Potential impact on susceptible populations is moderate:** Impact will depend on what development is forthcoming where within Seattle. In Portland the majority of residential development is on the outskirts of the city in lower income neighborhoods. If developers are unwilling to incorporate green building practices in order to receive at minimum a waiver, there is the potential that developers would pass that cost onto the home purchaser, business, or lessee. This could place an additional financial burden on those families and business owners in these neighborhoods.
- **Synergy with current SCL and PSE policies:** The policy would certainly have some interaction with existing Seattle City Light and Puget Sound Energy policies. Traditionally, both utilities have been interested in promoting innovation in energy efficiency practices that go beyond current energy code. Likewise, the feebate is aimed at doing the same thing; it creates an incentive to innovate beyond code through wholesale measures that penalize or reward projects based on performance. It is likely that the programs would be complementary, though the issue of redundancy would have to be addressed in the policy design and implementation.

LESSONS LEARNED

- Early and regular stakeholder engagement and careful media management is important
- Keep it simple – developers do not want to have to work to obtain additional incentives
- Commercial market more open to green building practices than residential market
- Initial outreach to residential developers and trade groups recommended
- Additional resources, perhaps in the form of a database, for developers, contractors, realtors, and trade professionals would help them gain familiarity and comfort with green building practice
- Avoid use of 'carbon' due to political sensitivity – a broader green building package is more acceptable
- Tying the feebate to third party standards allows for trained professionals to facilitate the process of policy adoption
- Set targets to stretch markets and be affordable for the City

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CASE STUDY: CITY OF PORTLAND GREEN BUILDING FEEBATE

Note: This policy is not yet finalized by Portland, and has changed since its original concept. Initially, the policy proposal was for a Carbon Feebate, but has evolved into being a Green Building Feebate.

1. THE POLICY

The City of Portland has had green building policies for City owned buildings in place since 2001. Following the success of these policies, the City Council directed the Portland Office of Sustainable Development to consider extending the policies. Due to the establishment of a Global Warming Action Plan, which included carbon reduction targets (10% reduction in CO_2 emissions by 2010 from 1990, 80% reduction by 2050), policy development initially focused on carbon, in particular a Carbon Feebate type policy.

Initially the Portland Office of Sustainable Development sought to fast track the Carbon Feebate policy development process. Following some unfortunate media coverage which portrayed the City as already having decided on the policy design and details, and the subsequent public resistance from homebuilders, the City decided that it would be beneficial to have more extensive stakeholder participation to be part of the policy development. In accordance with this plan, nine facilitated, collaborative public meetings were held to critique the options being proposed by the City. At the conclusion of these meetings, it was proposed that the policy should have a broader reach than just energy or carbon. Consequently, the feebate policy focus shifted from carbon to green building.

The policy was redrafted and referred to Green Building Standards, specifically LEED® and Earth Advantage, as opposed to just energy standards (such as ENERGY STAR). It was also deemed very important for the policy to be adaptive to updates in standards to which it was tied, so Portland is developing a 3-year update plan to keep the policy current. The next step is for the draft policy to go to the City Commissioners for internal review, after which point it will return to stakeholder committee for review before it is opened to the public for a 30-60 day comment and consultation period. Afterwards, the policy will be revised considering public comments and then go to the City Council for final approval as an ordinance in early 2009.

Commercial Building Proposal for July 2010

The Green Building Feebate is designed to reward high performance buildings with a green building fund. This fund would be financed by permit fees collected from buildings that only build to the minimum requirements of Oregon's (OR) energy code. If a developer provides a LEED® scorecard showing commitment to achieve a minimum LEED® rating, no building permit fee is charged. If the building fails to achieve the proposed rating, the fee is charged later. After investigating cost of achieving LEED® certification, Portland set the level of reward such that it would offset the additional costs of achieving a particular LEED® rating. Any commercial development of 5,000-50,000 sf will be subject to a fee (business as usual), a waiver or a reward. The same calculation is used for the fee as for the reward:

Fee waiver: Silver certification including minimum Energy & Atmosphere and Water Efficiency credits
Initial reward: Gold certification including minimum Energy & Atmosphere and Water Efficiency credits
Double reward: Platinum certification including minimum Energy & Atmosphere and Water Efficiency credits
Super reward: Cascadia GBC Living Building Challenge including net-zero energy and water requirements

The selection of minimum LEED® Energy & Atmosphere points for the waiver and initial reward are intended to improve energy efficiency by approximately 30% and 45% better than Oregon energy code.

Fee and Reward Calculation:

Carbon Fee and Reward Payment = Energy Use Intensity (EUI) Building Type x Square footage x (Carbon emissions ÷ Unit of energy) x ($12/ton CO_2) x 15-30 years building life (varying according to building type)

Fee/Reward Structure:

Fee and reward: $1.73 - $3.46 per sf
Super reward: $8.65 - $17.30 per sf

The minimum Energy & Atmosphere credit requirements should be seen as a mechanism to stretch the market, rather than transform it because the commercial market has already been transformed in Portland.

Residential Buildings
Any home above 1,200 sf will be subject to the fee, and any home, regardless of size, can be eligible for the rewards. Stakeholders wanted to design the policy such that it did not reward large homes. Consequently, the reward is a flat reward for residential, though the fee varies with the size of the house. The City elected to include the Earth Advantage Silver Program certification as an alternative to LEED®, as it is considered by homebuilders as a less costly certification to achieve. There is ample representation of Earth Advantage and other third party certifications in the residential market; currently, approximately 10% of homes are achieving some level of LEED®, Earth Advantage, or ENERGY STAR certification.

Reward Structure:
Waiver: Earth Advantage Silver with a minimum ENERGY STAR Home Energy Rater Score (HERS) score of 75 = ENERGY STAR certification.
Initial reward: Earth Advantage Gold or LEED® for Homes Silver certifications with a minimum HERS score of the current minimum for Earth Advantage Gold): $1,285-$2,570.
Double reward: Earth Advantage Platinum or LEED® for Homes Gold certification with a minimum HERS score of the current minimum for Earth Advantage Platinum): $2,570 - $5,140.
Super reward: LEED® for Homes Platinum or Cascadia GBC Living Building Challenge with net zero water and energy: $12,850 - $25,700

Fee Structure:
Fee: $0.51 - $1.03 per sf

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The City of Portland modeled four potential policy uptake scenarios in their analysis, which informed them as to whether the City would have sufficient funding to pay the rewards a high adoption scenario. Adoption ranged from 25% in the base case scenario to 70% in the high adoption scenario.

2.2. Energy Savings Potential

There is a wide range of energy savings potential for this project based on potential uptake scenarios. All incentives are tied to modeled performance. There is no incentive for monitoring actual building performance.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

Half a million dollars has been assumed for technical assistance and administration for the fee.

3.2. Cost to the Developer

An economic assessment that is being performed for the City of Portland assumes that a 1% cost premium would be necessary for the waiver, and a 2% cost premium for the reward. Developer Bill Jackson confirmed this estimate with his Mississippi Avenue Lofts development, which had a 2-3% cost premium and is designed to meet LEED® Gold standards. The intention of the policy is to offset all of the added costs. For those projects that do not comply, the fees would represent a small, but noteworthy, percent of total project cost (<1-4%).

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The Office of Sustainable Development has five members of staff, two of whom will oversee aspects of the Green Building Feebate policy.

4.2. Ease of Initiation

The policy required a good deal of deliberation and negotiation in order to make it politically feasible. Thus, the policy development phase proved to be challenging, with the hopes that this work upfront would smooth way for a relatively conflict-free implementation.

4.3. Funding Requirements

The Green Building Fund will pay for the policy implementation; this fund will come from the new building permit fees. If excess dollars are generated through the fee, the community will advise on spending.

4.4. Educational Outreach Requirements

It was critical to include stakeholder participation in the policy development and review process. As evidenced by the change in the policy to refer to green building standards, stakeholder input altered the course of this policy dramatically. It was suggested that a small table format is used in the stakeholder sessions to ensure all parties have the chance to voice their opinions, rather than having the sessions dominated by a vocal few.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

This policy is not viewed by the Portland Office of Sustainable Development as just a commercial green buildings market transformation policy. Rather the policy was motivated by the desire to increase specific aspects of green building, energy and water efficiency, and particularly affect development practices in areas with less exposure and experience with green building.

The green building market resides primarily in the inner city areas, where developers and occupants have had years of exposure to green building. In fact, 60% of commercial development in Portland is already LEED® registered or certified. The majority of new and projected residential development, however, is located on the outskirts of the city where affordability is the critical determinant in home development and purchase. In these areas, neither developers nor residents have shown much interest in green building. Therefore, one key success factor for the feebate policy is successful outreach to homebuilders (with emphasis on small homebuilders that specialize in single-family homes) and realtors. Many were concerned about potential project cost premia necessary to avoid paying the fee, and how this would affect the profitability of their projects.

According to local developer, Bill Jackson, it is imperative that other stakeholders – namely, members from banking, appraisal, labor unions, and trade groups – understand the requirements of the policy so they are in a position to support the city in implementing the policy. Otherwise, the administrative cost to the developer of achieving the required green building standards may be unacceptably high.

5.2. Acceptability to Stakeholders in Real Estate Community

The City felt it could have engaged more effectively with realtors, the Portland Business Alliance and Portland Metropolitan Association of Building Owners and Managers (BOMA) to understand their perception and concerns about this type of policy. It was suggested that the City needs to develop a solid business case for green building in their regional context with well documented case studies of successful projects to support the claim that these projects are feasible outside of government and commercial buildings.

6. REFERENCES

Vinh Mason, Portland Office of Sustainable Development;

Bill Jackson, Developer, Mississippi Avenue Lofts

Density Bonus

POLICY OBJECTIVE

To create an incentive for developers to incorporate green building practices and/or achieve specified local sustainability objectives by permitting additional floor space above the permitted zoning for qualified projects.

DESCRIPTION

Seattle's current Density Bonus program is focused on the downtown area and is tied to the LEED® certification system. It awards progressively higher LEED® certifications with higher Floor-to-Area ratio (FAR) increases. The policy will shift its geographic focus to in areas outside of downtown at the end of the year. This policy will have a similar design and focus.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★★	**COST EFFECTIVENESS**	★★★★★
ECONOMIC BENEFIT	★	**ADMINISTRATIVE FEASIBILITY**	★★★★
COST OF POLICY IMPLEMENTATION	★★★		

ENERGY EFFICIENCY POTENTIAL ★★

Long-term energy savings potential is high at the project level, though overall impact on energy efficiency in new construction dependent on policy uptake.

- **Policy uptake is likely to be high in areas that can support density:** Policy should not be uniformly applied throughout the city, but focus in on areas that can support increased density. Consequently, the policy has a ceiling on its policy uptake (% of new construction affected) due to geographical constraints.
- **Cumulative energy savings of approximately 1,100,000 – 1,400,000 MWhr for new construction through 2030:** One critical piece of the policy design will be the financial incentive – the FAR increase which would meet development density goals and incentivize developers to achieve higher levels of energy efficiency. If the marginal increase in development costs are high from building at higher densities, and lease rates or sales values are low, then developer participation will also be low. To maximize energy savings, the policy design should specify achievable energy efficiency standards (likely on the order of LEED® Silver) and attractive FAR incentives (ranging from 0.2 to 0.4) for each typical building type and size.
- **Consistent with targets outlined in 2030 Challenge targets:** The Seattle Density Bonus program is already tied to LEED® certification standards. To meet the 2030 Challenge goals, Seattle should consider prescribing specific energy performance credits and/or local sustainability criteria as an additional program qualification prerequisite. Monitoring of policy adoption over time will also be important in assessing the policy's compatibility with the 2030 Challenge.

ECONOMIC IMPACTS ★

There is limited potential for new job creation, but some positive economic impact could result from higher density developments with high performance buildings.

- **Limited Impact on job market due to narrow target market within new construction:** The policy would primarily support existing green building professionals and impact the green building industry.
- **Lower-income areas could benefit from green projects:** Strategically prioritizing projects located in lower-income neighborhoods or business districts could give residents in energy efficient homes more discretionary income through lower utility bills and reduced transportation costs through access to transit and employment if the density bonus is realized along transit corridors.

COST OF POLICY IMPLEMENTATION ★★★

City of Seattle Density Bonus program adds only marginal, if any, costs to the City, but may require additional planning staff if the program were widely adopted by the development community.

- **Program will not likely require additional funding from the City, as the policy can draw on existing program:** The Seattle Density Bonus is in place, though it expects to change its geographical focus in 2009. If the project

expands to accommodate a large project flow, then it may be necessary to hire additional staff to oversee the project.
- **Program qualification may result in cost increases for the developer, though increase rentable floor space should more than offset the costs:** Developers that elect to pursue the Density Bonus program, the marginal cost of developing green would most likely be less than the benefit that they receive in financial gains.
- **Program could result in cost increases for City due to increased demand for infrastructure, services, and transit**
- **Policy could strengthen the business case for green buildings in Seattle**

COST EFFECTIVENESS ★★★★★

The cost-benefit analysis indicates that program is effective for the City and financially advantageous for the developer. Policy uptake limitations due to geography place a ceiling on the cost effectiveness.
- **Direct City Benefit Cost ~5.0** $5.00 of energy savings per $1.00 of program costs to the city
- **Direct Developer Benefit Cost ~8.1:** $8.10 of financial benefit to developer per $1.00 of developer costs
- **Net Benefit Cost ~7.9:** $7.90 of monetized energy savings and financial benefit to developer for every $1.00 of costs to the city and developer. Direct monetized energy savings are calculated assuming 9-20% developer participation. This would imply that the program is highly desirable for developers which specialize in buildings that can support additional floor area easily.
- **Cost per MWhr saved low:** ~$4.67 per MWhr saved

ADMINISTRATIVE FEASIBILITY ★★★★

City of Seattle's pilot program provides a programmatic infrastructure and experience, in order to easily adapt the policy to target different building types, sizes, and locations, or have different goals.
- **Little difficulty in initiating policy:** The policy already exists in Seattle, though it is being expanded.
- **Good program flexibility:** Seattle could include either credits from the Energy and Atmosphere section of LEED® or local sustainability criteria in order to adapt the program to different program targets.
- **Policy needs enforcement mechanism such as a bond requirement**
- **Seattle staff already trained in LEED®**

STAKEHOLDER IMPACTS
- **Additional financing offsets the expected project cost increases:** Allowing additional floor area may incentivize innovative green building strategies and technologies that would otherwise have been removed from the project due to financing constraints.
- **Good synergy with existing SCL/PSE policies:** The Density Bonus program is designed to promote innovation in energy efficiency practices that go beyond current energy code, similar to SCL and PSE's programs.

LESSONS LEARNED
PROS
- Cost effective policy – low program costs (low cost to City and large net benefit to developer) for the energy savings benefits
- Few new resources or staffing requirements are needed to implement policy, depending on policy uptake
- High potential for providing visible models of high performance and sustainable development for Seattle developers

CONS
- May require stringent enforcement mechanism such as a bond
- Need for careful planning and community engagement in selecting areas
- Difficult to incentivize development beyond the basic threshold requirements of the program
- Policy may not be as effective in addressing residential developers

CONSIDERATIONS IN POLICY DESIGN
- Threshold building performance – appropriateness of including LEED® credits or local sustainability requirements
- Target of policy – project building type/size, target policy adoption, which end of the green building spectrum
- Geographic focus on the density bonus program within City of Seattle
- Inclusion of an enforcement mechanism such as a bond program to ensure program compliance

CASE STUDY: COUNTY OF ARLINGTON DENSITY BONUS PROGRAM

1. THE POLICY

Program Requirements

The density bonus provided by the County of Arlington depends of the level of LEED® certification.

LEED Certification	Floor-to-Area (FAR) Increase
LEED® Certified	0.15
LEED® Silver	0.25
LEED® Gold or Platinum	0.35

The program will allow the County Board to consider a modification of use regulation for additional density between 0.15 and 0.35 FAR and/or additional height up to 3 stories for special exception site plan requests. The site plan proposal must guarantee a LEED® Certified rating or above (Silver, Gold, or Platinum).

The provision of LEED® certified green building components does not guarantee additional density and/or height, or any particular amount of density or height. Site plan requests for bonus density and/or height will be analyzed on a case-by-case basis based on the characteristics of individual sites. The provision of LEED® certified green building components will be a part of the typical site plan negotiations for environmental amenities in exchange for the requested bonuses.

The program is scheduled for a revision in December 2008, which may result in the inclusion of specified LEED® credits pertaining to energy, water efficiency, heat island effect, construction waste, and stormwater as qualifying criteria for the program in 2009. Additionally, the policy may be revised so that bonus density is only offered to buildings seeking LEED® Silver certification or above, thus eliminating the bonus density for LEED® Certified status.

Disclosure Qualifications

A developer requesting a density bonus must submit a LEED® scorecard and proof of LEED® registration along with the proposed site plan. If the requested bonus is approved, the County includes a formal condition in the site plan requiring the building to incorporate the green building measures. The site plan condition does not specify the exact LEED® credits that have to be met, but rather specifies a total number of LEED® credits. The specific credits can change through the process, but the total number must be achieved.

In addition to requiring a LEED® Accredited Professional working on the project, the County's own green building program staff undertake several reviews during the site plan and permitting processes, to ensure the projects achieve their selected LEED® criteria.

Enforcement

The policy is enforced through a performance bond, or a financial bond that the County requires to guarantee compliance with the green building requirements of the incentive program. In 2005, the County revised the formula for calculating the bond to more fully capture the market value of bonus density awarded to the project. The new formula is: "(FAR value per ft^2) x (Bonus Density Space)," and the "FAR value per ft^2" is calculated annually by the County for the purposes of property assessment. If the project fails to obtain LEED certification or misses four or more points, 100% of the bond is forfeited; achieving LEED® certification but missing up to 3 points results in forfeiture of 50% of the bond.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

A significant percentage of current projects are taking advantage of the financial incentive. As of early 2008, County officials estimated that roughly 10 of approximately 25 site plan projects being processed were pursuing LEED® certification. In light of the fact that compliance with Arlington County codes will itself earn projects many LEED® credits, the County may consider increasing the minimum green building level required to qualify for the incentive.

2.2. Energy Saving Potential

The energy saving potential of this program at the project level is substantial – LEED® certified projects can achieve anywhere from 15%-50% energy reduction over baseline. As evidenced by the policy uptake, the basic financial incentive of increased FAR is sufficient to entice some developers to comply with the green building stipulations. City officials speculate that many of the participating developers did not enter into the process with much experience in green building. City officials claimed that the financial incentive of the density bonus was a key determinant in improving the performance of qualified buildings. This view was confirmed by Keech Co., as their decision to pursue LEED® certification was based, in great part, on the financial incentive of the additional rentable floor space. The decision to certify the Navy League Building at the LEED® Silver level has resulted in a 20% improvement in energy efficiency.

Currently, there is no monitoring or evaluation component to the program. City officials identified the need to verify actual building performance post-occupancy, and have had preliminary discussions as to how a monitoring and enforcement program may be incorporated. No recommendations on the monitoring and evaluation mechanism have been decided upon.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

The initial program cost was negligible, as there was no additional staff hired to oversee the program. Since that time one new staff member has been hired. The current program administrator commented that the program could use two or three more staff to have the capacity to handle the anticipated number of applicant reviews.

3.2. Cost to the Developer

The cost of qualifying for the Density Bonus program varied according to development type, size, and location. According to the program manager, the cost to developers ranged from 0-1% for LEED® Certified to 3-6% for LEED® Gold. According to Keech, Co. the cost of achieving a LEED® Silver certification was less than 1% of total project cost (~$200,000) for their Navy League Building. These costs were more than recouped by the 12,000 additional office space that they have been able to lease at above market rates, resulting in more than $400,000 in additional lease revenue per year.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The Environmental Planning Office, which has primary responsibility for working with applicants, reviewing green building documentation, and ensuring compliance, is located within the Department of Environmental Services. This office coordinates with the County's planning and building inspection staff, located within a separate agency, the Department of Community Planning, Housing and Development. Officials note that inter-agency coordination has presented a challenge for implementing the policy, because one office handles policymaking and document review functions, and another office handles permitting/inspection functions. The program has overcome this challenge by devoting considerable resources to working with applicants in the early phases of project review, and by providing strong financial incentives for projects to obtain LEED® certification.

4.2. Ease of Initiation

The program did not require extensive policy research and development or stakeholder involvement prior to implementation. As the program is implemented by a separate team of zoning and LEED® specialists, it had little effect on the existing permitting process.

4.3. Educational Outreach Requirements

In coordination with other green building incentive programs, Arlington County provided training on the LEED® system for 35 County staff, including planners and inspectors, and has also held numerous workshops for other communities.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

The financial performance of a project is highly dependent on its revenue generating potential. A density bonus allows a developer to add rentable or saleable floor space to their buildings, thus improving its revenue generation. The key in understanding why this is a financially advantageous strategy concerns the marginal cost of adding the additional floor space and the marginal cost of meeting a specified LEED® standard. First, the cost of constructing the additional floor space is marginally less than developing that same amount of floor space as a separate building, with separate land and permitting costs. Secondly, the additional floor space will add more revenue than it cost the developer in a green building premium. Consequently, the density bonus is a popular policy among developers, as evidenced by the high policy uptake rates.

Developer, Keech, Co., emphasized their enthusiasm for the program, which they claimed was key in differentiating their building from other new buildings entering the market, and has resulting in very attractive financial rewards from the 12,000 square feet of additional floor space that was added to the Navy League Building.

6. REFERENCES

Joan Kelsch, Environmental Planner, Arlington County

Bill Keech, Developer, Keech, Co.

Priority Green Permit Program

POLICY OBJECTIVE

To create an incentive for developers to incorporate green building practices and/or achieve specified local sustainability objectives by giving greater assistance and facilitation through the permitting process for qualified projects.

DESCRIPTION

The Priority Green Permit Program is currently in its pilot phase in Seattle and offers the following benefits: single point of contact; assistance by an integrated team of design and permitting staff; facilitate and coordinates priority land use and building permit review; and support and facilitation in navigation of complex code issues. The program specifies a variety of sustainability requirements to qualify, including an Energy and Climate requirement, which mandates that all projects must meet either a 60% energy & fossil fuel use reduction using EnergyStar Target Finder, or building performance improvement of 20% over Seattle Energy Code for commercial building projects and an improvement of 30% for residential projects.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★★	COST EFFECTIVENESS	★★★
ECONOMIC BENEFIT	★	ADMINISTRATIVE FEASIBILITY	★★★★
COST OF POLICY IMPLEMENTATION	★★★		

ENERGY EFFICIENCY POTENTIAL ★★

Long-term energy savings potential is high at the project level, though overall impact on energy efficiency in new construction dependent on policy uptake.

- **Policy uptake is dependent on the threshold building performance standards and the magnitude of the financial incentive:** Seattle's program focuses on offering project facilitation services, and does not explicitly guarantee a reduction in the permitting process time. If Seattle offered an expedited permit service, this added financial incentive would likely attract more developer interest. If the program wants to increase its potential policy uptake, it could employ a model similar to Chicago's, which has a tiered system of incentives for buildings with differing levels of performance and certification. If Seattle wants to focus primarily on innovative projects, it could employ a model similar to San Francisco's, which offers the program to any projects that aim to achieve a LEED® Gold certification. Policy uptake scenarios range from 4% to 15% of new development, escalating each year through 2030.
- **Cumulative energy savings of approximately 640,000 - 780,000 MWhr for new construction through 2030:** Figure assumes current energy savings targets from current policy to be constant through 2030, and estimates policy adoption based on case studies (ranges from 4% to 15%). To maximize energy savings, the policy must address a broader share of new construction, through appealing to residential homebuilders (over 70% of future projected development).
- **Consistent with targets outlined in 2030 Challenge targets:** The Seattle Priority Green Permitting Program standards are already directly mapped onto the 2030 Challenge goals. Monitoring of policy uptake and actual building performance will also be important in assessing the policy's effectiveness in achieving the 2030 Challenge goals.

ECONOMIC IMPACTS ★

There is limited potential for new job creation, but some positive economic impact could result from ability to respond more quickly to spikes in real estate and from funding projects in lower-income areas.

- **Limited impact on job market due to narrow target market within new construction:** The policy would primarily support existing green building professionals and impact the green building industry.
- **Expedited process could result in faster response to market real estate market opportunities:** A shortened development approval process may allow developers to respond to immediate employment growth demand that may have otherwise flowed to other surrounding cities with faster approval processes.
- **Lower-income areas could benefit from green projects:** Prioritizing projects located in lower-income neighborhoods or business districts could give residents and business owners more discretionary income. It would also encourage development in areas often left behind during construction booms, when market timing is essential to the developer.

COST OF POLICY IMPLEMENTATION ★★★

City of Seattle Priority Green Permitting program adds only marginal, if any, costs to the City, but may require additional planning staff if the program were widely adopted by the development community.

- **Program will likely require additional funding from the City:** The policy can draw on the existing program, though it will need to be expanded for high policy adoption scenarios.
- **Following the Chicago model of fee wavier/reduction for high performance buildings could be costly:** Seattle could offer a tiered system of benefits as in the Chicago model, in which progressively better building performance receives higher financial rewards. This approach would reduce fee revenue from building permits, in effect reducing the budget of the DPD. San Francisco's model of targeting a small number of innovative projects would not require many additional costs for the City.
- **Program qualification may result in cost increases for the developer:** Program could offset some of these costs to developers, if it guaranteed reductions in pre-construction time through an expedited permit service.

COST EFFECTIVENESS ★★★

The direct city cost benefit is high favorable, though the net cost benefit indicates that the costs outweigh the benefits due to high costs to developer and low monetized energy savings.

- **Direct City Benefit Cost ~6.1** $6.10 of energy savings per $1.00 of program costs to the city
- **Direct Developer Benefit Cost ~0.8-1.2:** $0.80-$1.20 of financial benefit to developer per $1.00 of developer costs, assuming an expedited permit program which reduces permitting time by 2 to 3 months. Benefit Cost reduces to 0 if program achieves no reduction in permitting time.
- **Net Benefit Cost ~1.2-1.6:** $1.20-$1.60 of monetized energy savings and financial benefit to developer for every $1.00 of costs to the city and developer, assuming an expedited permit program which reduces permitting time by 2 to 3 months. Net Benefit Cost ratio reduces to ~0.5 if no reduction in permitting time.
- **Cost per MWhr saved low:** ~$8.33 per MWhr saved

ADMINISTRATIVE FEASIBILITY ★★★★

City of Seattle's pilot program provides programmatic infrastructure and experience, though it will have to expand in order to increase policy adoption and/or offer expedited permitting services for participating projects.

- **Policy initiation will require additional resources if program expands target market or service offerings**
- **Good program flexibility:** The Priority Green Matrix used in the Seattle program details the project performance necessary to qualify for the program benefits, and can be adapted to current conditions and/or changing policy goals.
- **City staff education needed regarding Priority Green Matrix system and permitting service needs of green projects**

STAKEHOLDER IMPACTS

- **Current program offers little financial incentive for developers inexperienced in green building:** The current policy tends to benefit large developers experienced in green building the most, as the fixed costs of "greening" a big project are easier to absorb. Participating developers may look to recoup additional costs through leasing rates and sale prices, which would bias the program towards high end development.
- **If permitting time is increased for typical developments as a result of City staff diverting resources from the building permitting process, developers will be impacted financially**
- **Good synergy with existing SCL/PSE policies:** The Green Priority Permitting Program designed to promote innovation in energy efficiency practices that go beyond current energy code, similar to SCL and PSE's programs.

LESSONS LEARNED

PROS

- Cost effective policy – low program costs for the energy savings benefits, though limited due to policy uptake
- Few new resources or staffing requirements are needed to implement policy in its current form
- High potential for providing visible models of high performance and sustainable development for Seattle developers

CONS

- Incentive unlikely to be large enough to attract much new adoption (need a more substantial indirect financial incentive)
- Program can be biased towards larger projects with high-end occupants/buyers
- Policy may not be as effective in addressing residential developers

CONSIDERATIONS IN POLICY DESIGN

- Threshold building performance – appropriateness of including LEED® credits or local sustainability requirements
- Financial feasibility of a fee waiver/reduction, and the likely impact of offering such a service
- Target of policy – project building type/size, target policy adoption, which end of the green building spectrum

CASE STUDY: CITY OF CHICAGO GREEN PERMIT PROGRAM

1. THE POLICY

Overview

Chicago's Green Permit Program offers an incentive to developers in the form of an expedited permitting process and tailored design and permitting support from permitting specialists for projects that meet green building criteria. The program offers two main incentives. The first incentive is that permitting time is reduced to as little as six weeks from the time of construction document submission – approximately half the typical time required. This time saving can translate into substantial financial benefit for developers because earlier construction starts mean earlier sales or leasing and reduced interest on construction loans.

The second incentive is that the program offers a more direct financial benefit in the form of reduced permitting fees. Developers typically pay additional fees for the services of city plan review consultants – up to 100% of these fees are waived for projects that qualify.

Project Qualifications

The Green Permit Program specifies the minimum threshold level of qualification necessary to enroll in the program. All qualifications are tied to a third-party standard (see sample of Project Qualifications table below), as well as a certain number of Menu Items, nine areas that have been targeted for additional emphasis, including Exceptional Energy Performance. While all non-residential buildings are required to meet a target LEED® certification, some residential buildings are required to use the Chicago Green Home standard. This system uses a prescriptive approach in which design strategies/technologies are awarded points which are tabulated and ranked in a 3-star rating scale.

Project Type	Benefit Tier I	Benefit Tier II
Requirements	• **Expedited Permit (< 30 days)**	• **Expedited Permit (< 30 days)** • **Consultant Review Fee Paid Up to $25K**
Residential	LEED® Certified/Silver + 2 MI	Chicago Green Home ★★ + 2-3 MI
Institutional	LEED® Certified + 2 MI	LEED® Silver + 2 MI
Industrial	Not Applicable	LEED® Certified + EnergyStar Roof + 1 MI
Retail	LEED® Silver + Energy Star Roof + 2 MI	LEED® Silver + 25% Green Roof + 2 MI
Office	LEED® Silver + 50% Green Roof + 2 MI	LEED® Silver + 75% Green Roof + 2 MI

Expedited Review Incentive

The program provides a building permit turnaround time of 30 business days, which corresponds to the time between submission of the building permit application with complete drawings and the time a building permit is issued. Program officials note that for large commercial projects, this turnaround time compares to an average of about 90 days for permitting non-expedited projects. On the other hand, the incentive is not particularly valuable to very small residential projects whose builders are familiar with the permitting systems, as those projects can often be permitted within a week. The turnaround time is broken down as: two weeks for agency review, two weeks for the applicant to respond to the review, and two weeks to address other issues that arise. Officials note that many participating projects do not achieve the 30-day goal, mainly because they do not respond in a timely manner once the agency has completed its review.

Financial Incentive

The City also offers fee waivers for applicants that are subject to the Developer Services program, which requires outside consultants to conduct plan reviews for large, complicated projects. Normally such projects are required to pay the consultant's fee, which ranges from about $5,000 - $50,000. The Green Permit Program offers a waiver or a reduction of this consultant review fee, based on the extent to which green measures are incorporated. For Tier II qualifying projects, 100% of the first $5,000 can be waived, and 50% of the remaining fee up to a maximum of $25,000. Small residential development would not be eligible for this incentive, as they are not subject to the Developer Services requirement.

Other Key Elements of Green Permit Program

Moving green projects to the front of the plan review queue may expedite permitting in some jurisdictions, but in Chicago most would still be at risk of delays because of the complexity of the permitting process. To help developers navigate this complexity, projects that qualify for the program receive a much higher level of customer service than typical large developments. Developers are given a single point of contact with the program, and the permitting specialist maintains involvement with projects early on and throughout the design process in order to identify potential permitting problems and solve them in advance. Green assistance and permit assistance are fully integrated, so rather than provide an outside advisory group specific only to green strategies, one individual is responsible both for ensuring a project's sustainability and for coordinating its regulatory process.

Pre-permitting Coordination and Documentation

A key feature of the program is early consultation with applicants. Typically, larger projects contact the Green Permit Program 3 to 4 months prior to submitting a building permit application, and program staff work with the project over the course of those few months to discuss how the project will achieve certification and to help coordinate the requirements of other City agencies (e.g., Planning, Zoning, Transportation). The Green Permit Program staff work with applicants to help explain those requirements and resolve potential conflicts.

Approximately 4 to 6 weeks prior to permit submission, LEED® projects submit 50% construction documents and their green building documentation for the program's Preliminary Review Meeting. This documentation includes: 1) a LEED® registration number; 2) a LEED® scorecard; 3) a green permit narrative; 4) identification of Menu Item(s) selected; and 5) specifications demonstrating how green building measures will be achieved.

Enforcement

If the project fails to obtain LEED® certification, the owner is barred from future participation in the Green Permit program, and the City reserves the right to seek repayment of any waived fees.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

According to the City the policy has been well received by developers; in 2007, the program processed more than 200 projects, representing more than 1,000,000 sf of new development (60%) and existing building retrofits (40%).

Although Chicago's Green Permit Program has been successful over its short history, there remains room for enhancement. Terra Firma suggested that additional incentives – such as the partial waiver of basic permitting fees – may be necessary to draw in more small projects like the installation of solar thermal panels on single-family residences.

2.2. Energy Saving Potential

The basic financial incentive of reduced pre-construction time is enough to entice many developers to comply with the green building stipulations. The added financial incentive of the waived consultant fees creates pressure to achieve an even higher level of energy performance. Depending of the level of reward, projects can achieve 20% to 45% energy reduction over a typical project. A recent participant in the program, Terra Firma, claims that their Fountain View Condos project is achieving approximately 33% energy savings.

Though achieving energy performance beyond what is required in the LEED® rating system is not mandated, developers are encouraged to pursue the "Exceptional Energy Performance" Menu Item, which states that LEED® projects must earn at least 4 points under LEED Credit EAc1, Optimize Energy Performance. This Menu Item, however, has not been very popular thus far due to the relative cost of achieving this Menu Item versus others.

Currently, there is no monitoring or evaluation component to the program. City officials identified the need for verification of actual building performance, and have had preliminary discussions on how a monitoring and enforcement program may be incorporated in the Green Permit Program.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

The Green Permit program required one new staff member at the onset of the program to act as coordinator. Once project applications increased to the point of necessitating another dedicated employee, one more full-time employee was hired

to accommodate the larger workflow. In addition to employee costs, there were other costs to the City, specifically, in the training and education costs to prepare the Developer Services Group for the program.

The City also absorbs the cost of waiving the consultant fees for projects that qualify for Tier II support, which comprise approximately 10% of projects in the program. Last year, this resulted in a total of approximately $400k distributed in waived consultant fees. This incentive was made possible, in part, because the Department of Buildings budget is not directly tied to fee and other permitting revenue generation. Fee revenues generated contribute to the general budget of the City and are redistributed to various departments according to their budgetary needs.

3.2. Cost to the Developer

The cost of meeting the standards specified in the Green Permit Program vary across developers and building types. However, according to program officials, meeting Tier I requirements results in approximately 1 to 2% increase in project costs and meeting Tier II requirements results in a 2 to 3% increase in project costs. Developer Terra Firma, in their Fountain View Condos project, experienced a project cost increase of approximately 2%.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The Department of Buildings administers the program, and has a dedicated group of two green permitting specialists that oversee program administration.

4.2. Ease of Initiation

The program did not require extensive policy research and development or stakeholder involvement prior to implementation. As the program is implemented by a separate team of permitting specialists, it had little effect on the existing permitting process. In order to achieve the targets of processing permits for qualified green projects, the Department of Buildings incorporated a new electronic record keeping system that utilized AutoDesk software to keep track of document submittals and reviews for projects in the program. Learning to use this new system required some on-the-job training for permitting specialists and applicants alike, but now greatly reduces the administrative burden of document exchange and review.

4.3. Educational Outreach Requirements

Word-of-mouth advertising was used to communicate the program to developers. The primary educational needs were internal – staff required training regarding the new permit procedure and third-party rating systems – LEED® and Chicago Green Homes.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

A developer typically spends a substantial amount of time in the permitting process, between 3 to 6 months. Admittance into the Green Permit Program reduces that time to approximately 30 business days. Terra Firma claimed that they received a significant economic benefit through reduced pre-construction time and construction loan payments, as well as lower administrative costs. In total, they estimated that their savings were approximately 2% of project costs. Thus, for developers like Terra Firm, the Green Permit Program reduces the cost of doing business, and consequently is a very popular policy among developers, as evidenced by the high policy uptake rates.

6. REFERENCES

Bradley Roback, City of Chicago Green Permit Program

G. Benjamin Ranney, Developer, Terra Firma

CASE STUDY: CITY OF SAN FRANCISCO GREEN PRIORITY PERMITTING PROGRAM

1. THE POLICY

In October 2007, the San Francisco Building Inspection Commission and Planning Commission jointly issued new fast track directives that provide market-based economic incentives to developers planning to build major new commercial developments. The program will make provisional exceptions for other qualifying project types. These directives provide priority permit reviews from both the Department of Planning and Building Inspection Department to all new and renovated buildings that achieve LEED® Gold certification or equivalent, a process that shaves at least six months' waiting off the development's total timeline. Applied to projects valued at millions of dollars, these time savings translate quickly into bottom-line, long-term investment incentives.

Project Qualifications

Since 1999 the City of San Francisco has mandated green building standards for its municipal buildings. The standard is currently LEED® Silver Certification. In developing the program for the private sector, the City wanted to reward projects that are pushing the envelope in terms of green building practices beyond what is customary in San Francisco. Therefore, the City selected LEED® Gold Certification as the minimum threshold for the Green Priority Permitting Program. There is discussion about raising the standard to LEED® Platinum Certification and including local sustainability criteria tailored to San Francisco, though no final decisions have been made.

The initial application includes an agreement prepared and executed by the Department of Environment. The agreement must be accompanied by a LEED® checklist to specify the elements of the project that will achieve credits towards the LEED® Gold Certification, and includes a processing fee required by the Department of the Environment. Prior to the Department's evaluation of the project for priority processing, the applicant must meet with the SF Green Team, comprised of technical staff from reviewing agencies, to describe the project.

Target Timeline

The target timeline is two weeks for assignment (the elapsed time between arrival of an application at the Department of the Environment and assignment to and receipt by Planner) and two weeks for initial review (the elapsed time between assignment and the planner's first review of application for project scope and application completeness). It should be noted that the permits in review are only environmental permits. Once a project passes through the expedited environmental permit review, it moves to the traditional permitting process. Typical permitting time in San Francisco is around 6 to 9 months.

Verification

The program requires that the project's site permit application be accompanied by a Design Phase Certification from the USGBC, and that final LEED® Certification be obtained with a Gold Rating within six months of issuance of the first Certificate of Occupancy, or Certificate of Final Completion. If the project fails to achieve a LEED® Gold Rating, developers would be required to attend hearings with the Planning Commission and offer a mitigation strategy to offset their failure to comply with their project's green building commitments.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The Department of the Environment expected to review around seven projects in the first year of the Green Priority Permitting Program. The actual policy uptake was double, with 14 projects slated to go through the process this year, representing well over two million square feet of development. The projects tend to be large commercial developments, though there was also one small mixed use development and a private school. The City has already encountered some capacity issues, and is finding it challenging to meet the target timeline of four weeks.

The City has is considering expanding the program to a much wider range of development, and will be structured as a tiered-benefit system, in which projects with varying levels of green building certification can apply for priority permitting

services.

2.2. Energy Saving Potential

The energy saving potential of this program at the project level is substantial – LEED® Gold projects can achieve 30% to 45% energy reduction over code requirements. As evidenced by the higher than anticipated policy uptake, the basic financial incentive of reduced pre-construction time is enough to entice some developers to comply with the green building stipulations. City officials speculate that many of the participating developers were already leaders in green building in San Francisco. It is, therefore, unclear how much the incentive offered by the Green Priority Permitting Program affected the level of energy savings and/or LEED® certification that the developer pursued.

The impact of this program on overall energy saving in new construction, however, is limited by the narrow focus of the program and the high barrier to entry. This was intentional on the part of the program designers in order to limit the number of applicant projects and afford the City time to develop the necessary internal procedures and experience in order to expand the program in the future. City officials intend to expand the program to include other building types and sizes after the program gains a track record of success with developments.

Currently, there is no monitoring or evaluation component to the program. City officials identified the need to verify actual building performance post-occupancy, and have had preliminary discussions as to how a monitoring and enforcement program may be incorporated. No recommendations on the monitoring and evaluation mechanism have been made.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

The additional employee costs for the program were negligible as the policy was integrated into the existing Department of Planning, Department of the Environment, and Department of Building Inspection infrastructure.

The City has experienced some indirect costs of implementing the Green Priority Permitting Program due to increased demands on permitting specialists. As the program was integrated into the existing permitting processing structure, resources that were allocated to the Green Priority Permitting Program were no longer available to the traditional permitting program. Thus, permitting specialists that process traditional project applications have seen their workload increase, resulting in additional project backlog. This backlog can increase the overhead costs born by the City, and has the effect of increasing permitting time for the majority of developers in the city.

3.2. Cost to the Developer

According to City officials, the cost to developer of achieving LEED® Gold Certification ranges from 2% to 5% of project hard costs. According to Matarozzi/Pelsinger Builders, the additional cost of pursuing a LEED® Gold Certification was approximately 2-2.5%. This cost was, in part, recuperated through the reduced carrying costs, which in the case of Matarozzi/Pelsinger Builders development – 355 11th Street – was approximately $75-$125k, or 2-3% of project cost. The financial payoff came not only in avoided carrying costs, but also in increased lease rates. Tenants in the 355 11th street building, which include an architecture firm and a restaurant, are paying up to three times market lease rates to occupy the building.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The program is administered by the Department of the Environment, with project oversight and advisory provided by the Green Team, comprised of the Chief Building Inspector, a representative from the Department of the Environment, and a representative from the Department of Planning.

4.2. Ease of Initiation

The program did not require extensive policy research and development or stakeholder involvement prior to implementation. As the program is implemented by an existing team of permitting specialists, it has impacted the existing permitting process by reducing the personnel resources available to administer the traditional permitting process. Some on-the-job training is required by the permitting specialists to learn how to administer the program and process

applications to meet the target timelines.

4.3. Educational Outreach Requirements

According to City officials, the educational outreach requirements were minimal. Word-of-mouth advertising was sufficient to attract twice the number of projects than were anticipated. Internal educational requirements were also minimal, as the involved staff was already LEED® Accredited Professionals. According to Matarozzi/Pelsinger Builders and Adlin Darling Design, permitting specialists could have benefited from more training and familiarization with the LEED® process. It was suggested that the city dedicate a team of permitting specialists, mechanical engineers, and LEED® Accredited Professionals to work exclusively on projects in the program.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

In the San Francisco permitting environment, a typical commercial development could take 6 to 9 months to have an environmental planner assigned to the project and receive a report of the project's compliance with environmental regulations. As the Green Priority Permitting Program would reduce this time to approximately one month, there are significant financial gains related to the resulting decrease in pre-construction costs, confirmed by Matarozzi/Pelsinger Builders.

The program currently caters to primarily large commercial developments. This is, in part, due to the cost of developing a LEED® Gold project – the marginal cost of achieving a LEED® Gold Certification for large commercial developments is lower as a percentage of project costs than for smaller developers. For smaller developers, the financial incentive offered by the Green Priority Permitting Program may not fully offset the incremental costs of developing a LEED® Gold project. According to Adlin Darling Design, it is important that the policy design take into account the relative difficulty that small developers have in absorbing the soft consulting costs associated with attaining a LEED® Gold Certification. It was suggested that the City provide smaller developers with mechanical and energy consulting services to help their projects achieve higher building performance without compromising their project budgets.

Setting a high barrier to entering the program was intentional on the part of the City. The narrow focus is allowing the City to refine its internal program processes and protocols while not being deluged in project applications in the first year. Even though the City intends to expand the program to include smaller developers, some concern has been expressed by the developer community that the program is biased towards well financed developers, while ignoring those that focus on smaller buildings who nevertheless also take on substantial financial risk in their developments.

6. REFERENCES

Richard Chien, City of San Francisco Department of Environment

Dan Pelsinger, Developer, Matarozzi/Pelsinger Builders

Shane Curnyn, Architect, Adlin Darling Design

Mandatory Green Building Certification

DESCRIPTION

The Green Building Mandate program would set specific targets for most new construction or refurbishment projects in the City of Seattle, based on a size or use threshold, and relying on a green building rating system such as the LEED® rating system (with specified energy credit requirements). A specific level of certification or number of points would be required, depending on the type of project; potentially with less stringent requirements for housing.

POLICY OBJECTIVE

The objective of the Green Building Mandate policy is to use a required Green Building Standard as an adjunct to the Building Code to raise the requirements for all aspects of a building's design that could affect energy performance.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★★★★	COST EFFECTIVENESS	★★★★
ECONOMIC BENEFIT	★★★★	ADMINISTRATIVE FEASIBILITY	★★★
COST OF IMPLEMENTATION	★★★		

ENERGY EFFICIENCY POTENTIAL ★★★★

Energy savings are dependent on the specific requirements of the mandate program.

- **Energy Savings Potential:** The impact of the mandate program is dependent on the green building certification level required by the policy as well as any required energy credits. One example would be to require eight LEED EA1 credits, which would require a 35% increase in energy performance compared to ASHRAE 90.1-2004; equivalent to approximately 20% above current Seattle standards. Another determinant of energy savings potential is the target segment of the building market (which may exclude single family homes, smaller development etc).
- **Cumulative Energy Savings:** This policy would generate energy savings of between 1,300,000 and 1,600,000 MWhr through 2030, assuming a 20% improvement in energy efficiency above code (approximately the level of energy improvement which should be sought by Seattle in order to achieve compliance with current Architecture 2030 goals), and 60% of new development complying with that standard (assuming 30% of new development is single family housing which may be exempt from the mandate and a further 10% of other new construction within the City would also excluded based on building size and use).
- **Consistent with targets outlined in 2030 Challenge targets:** To meet the 2030 Challenge Goals, the City should consider prescribing specific energy performance credits as a program qualification prerequisite.

ECONOMIC IMPACTS ★★★★

Substantial job creation potential for green building professionals, building inspectors and commissioning professionals if the policy is designed to drive a wholesale move towards green construction practices.

- **Job creation potential:** If the policy is designed to impact the majority of new construction projects and the standards are sufficiently stringent, the policy would drive a wholesale move towards green construction practices in the City. Regardless of the green building rating system used in the policy - LEED or a local standard such as the Green Matrix - it is likely that new jobs would be created in sustainability consultancy (i.e. LEED accredited or green building professionals, commissioning and inspection professionals etc.).
- **Policy enforcement:** Where existing green building policies already exist, officials have noted that enforcement is crucial to a policy's real world success. Despite this, enforcement is an area often overlooked or poorly administered. Strong policy enforcement in Seattle could lead to the creation of numerous jobs through the creation of a green building inspection and enforcement industry within the city. A third party program such as LEED would have more impact on the creation of private sector jobs associated with the compliance process, while a City specific program would likely create more internal City positions for review and oversight (with the associated funding needs) unless the certification review process was carried out by third party organizations.
- **Overly stringent policy could negatively impact real estate market:** Increased costs to developer would either get passed on to consumers or eat into profit margins, either of which could adversely impact the real estate market.

COST OF POLICY IMPLEMENTATION ★★★

Costs to City depend on whether Seattle uses a 3rd party certification or not. In either case, the majority of the implementation costs are borne by developers though start up costs to the City may also be significant.

- **Cost of implementation:** If the policy was tied to an external green building rating system such as LEED, the cost of implementing the policy is likely to be more manageable, as the certification process would be administered by the external rating body. The burden of cost for demonstrating compliance would be passed onto the developer through LEED certification fees. It would be more onerous to develop an internal standard such as the Green Matrix used in the Priority Green Permit program, which specifies specific building performance goals and acceptable means of disclosure. In this case, the City would absorb more of the costs, as staff would play a role in reviewing compliance therefore this route is not recommended, as the advantages of using a 3rd party system (i.e. decrease cost) would be lost.
- **Cost of administration is dependent on certification requirements:** If policy dictated that projects must be *certifiable* with a green building rating system, but not *certified*, the cost of determining compliance would be borne by the City, which could increase implementation and administration costs. San Francisco expects the majority of developments to become LEED certified and this is likely to be the case in Seattle. However the City may require additional staff or 3rd part reviewers to determine compliance for projects which do not follow this route.
- **Cost to the developer:** Green building rating system compliance is likely to result in cost increases for the developer in order to make buildings compliant with the more stringent requirements of the code. The energy model estimate of the cost of achieving a 20% energy efficiency improvement is approximately 2.1% of project cost.
- **Performance bond:** A performance bond could be required by the City, to ensure that projects comply with the mandated performance standards, similar to the performance bond model implemented by Washington DC. The legal implications of this in Seattle are still being investigated. This could provide a method of funding green building policy development and education and outreach activities.

COST EFFECTIVENESS ★★★★

The cost-benefit analysis indicates that program is effective for the City, though developers will experience some financial burden in complying with the standard at initiation.

- **Direct City Benefit Cost ~23:** $23.00 of energy savings per $1.00 of program costs to the City. This ratio is quite high due to the low cost to the City of administration and policy development, and high energy savings over time.
- **Net Benefit Cost ~0.2:** $0.20 of monetized energy savings and financial benefit to developer for every $1.00 of costs to the City and developer. This ratio is low due to the financial investment required on the part of developers (mainly on smaller projects where high levels of LEED certification are not already being sought) to comply with the standard (though the cost of compliance will decrease over time), with little corresponding financial benefit to the developer, in terms of additional rents or offset costs.
- **Cost per MWhr saved low:** ~$2.05 per MWhr saved.

ADMINISTRATIVE FEASIBILITY ★★★

Current City policy provides existing infrastructure and experience and could be extended to cover additional programs.

- **Policy initiation and implementation:** A green building mandate policy already exists in the City, requiring all City Capital Projects over 5,000 square feet to gain at least LEED Silver Certification. This provides existing infrastructure and experience for extending the policy to cover all new buildings in Seattle, based on a threshold size and use. Extending this policy would require analysis of possible conflicts between the standards in the City's current building codes and the requirements of the relevant LEED certification standard. This would place additional administrate requirements on city staff (with associated costs). The ongoing administrative requirements of are largely dependent on whether the City would require projects to be *certifiable* or *certified* with a green building rating system. By only requiring projects to be *certifiable* the City would have to shoulder some of the administrative burden for determining program compliance.
- **Good program flexibility:** Seattle could tailor the mandatory credit requirements in accordance with various levels of energy or green building targets, through the LEED rating system (e.g. by mandating that eight LEED EA1 credits be achieved).

STAKEHOLDER IMPACT

If the policy is phased in gradually, the impact on the development community will be mitigated.

- **Phasing in policy could allow for the building and construction industry to adapt to the new regulatory environment.**
- **Stringency of requirements could vary depending on the impact to each stakeholder group:** Seattle could vary

the mandate requirements to reduce the burden on those most likely to be impacted by the policy requirements, for example by requiring small commercial developments (less than 25,000 sq ft) to only submit a LEED checklist or single family and mid sized residential developments to submit a Green Points checklist, rather than meet full certification requirements. Financial assistance may also be provided to assist in achieving green building targets, as in Washington DC, where grants are available to affordable housing projects meeting mandatory green building certification standards.

LESSONS LEARNED

PROS

- Cost effective policy for the City – low program costs for the energy savings benefits, though cost to developer is high

CONS

- Program can place a relatively larger financial burden on smaller projects, as the cost of compliance for larger projects is lower as a percentage of total construction cost, than for smaller projects.
- Additional resources or staffing requirements may be needed to implement the policy depending on route taken
-

CONSIDERATIONS IN POLICY DESIGN

- Need to carefully consider the challenges and benefits of a mandatory Green Building Performance standard rather than more directly updating the codes themselves.
- Target of policy – what type/size of development should the policy target?
- Should projects be required to be *certified* or *certifiable*?
- Enforcement mechanisms such as using a bond system can ensure post-occupancy building performance.
- Threshold building performance qualifications – should additional specific credits (e.g. LEED EA1 energy credits) be mandated or additional local sustainability requirements included?

CASE STUDY: WASHINGTON DC GREEN BUILDING MANDATE

1. THE POLICY

Washington DC's Green Building Act of 2006 came into effect in March 2007 for public buildings and private leasing of public property. In implementing the Act, Washington DC became the first city in the US to require privately funded new construction projects to require LEED® compliance to be achieved. The Act was implemented in order to reduce the economic, environmental and social impacts of new buildings in the City and provides an integrated approach to planning, designing, building and maintaining buildings and their landscapes. Between October 1st 2007 and October 1st 2008, only projects owned or funded by the City were required to meet the green building standards, with additional types of projects phased in until the full implementation of the Act in October 2011.

Commercial Buildings

Publicly Owned or Financed Buildings

For new construction where 15% or more of a project's total cost is publicly financed and the project has a gross floor area of 10,000 sq ft or more, the project must be designed to achieve at least 75 points on the EPA national energy performance rating system as determined by the ENERGY STAR® Target Finder tool. Renovation projects are exempt from this requirement. Additionally, all projects must have their energy performance benchmarked annually using the ENERGY STAR Portfolio Manager tool. Non residential projects must also meet the requirements of LEED Silver Certification.

Privately Owned Buildings

Beginning on January 1st 2009, new construction or refurbishment projects with a floor area of 50,000 sq ft or greater must submit a green building checklist documenting the green building elements to be pursued in the building construction permit. In January 2010 this will be extended to require all projects resulting from sale of public property through deposition to be LEED Certified. From January 2012, all commercial buildings over 50,000 sq ft must be LEED Certified. In addition, incentives in the form of grants are available to projects exceeding the verification requirements of LEED Certified (until 2012) or LEED Silver certification (from 2012 until to 2015).

Residential Buildings

Publicly Owned or Financed Buildings

Since October 2007 publicly owned or financed residential buildings of 10,000 sq ft or more have been required to meet or exceed the Green Communities 2006 standard (or a substantially equivalent standard). Green Communities 2006 is national green building program designed by Enterprise Community Partners that provides criteria for the design, development, and operation of affordable housing.

Privately Owned Buildings

There are currently no requirements in the Act relating to privately financed residential developments.

Certification v Certifiable

The City requires that projects must follow the LEED certification process, with proof of a building's level of certification provided to the City in the form of a LEED certificate, provided by the USGBC (Green Building Certification Institute from 2009). Green Communities is not rated through a 3rd party certification body; therefore compliance must be demonstrated by the project teams themselves.

Performance Bond Requirements

In addition to meeting the mandatory green building standards defined by the Act, privately financed projects must pay a "performance bond" to the City; designed to ensure that a project complied with the performance standards mandated by the Act. If verification that the project has met the requirements of the Act is not provided within two years after the first certificate of occupancy is issued, all or part of the bond is forfeited to the City. The level of the bond is set based on the gross floor area of the building, as follows:

Projects not exceeding 150,000 sq ft Gross Floor Area (GFA):	2% of the total building cost
Projects of between 150,001 and 250,000 sq ft GFA:	3% of the total building cost
Projects exceeding 250,000 sq ft GFA:	4% of the total building cost, capped at $3MM.

In lieu of a bond, the statute also permits an irrevocable letter of credit from a financial institution authorized to do business in the District or evidence of cash deposited in an escrow account in a financial institution in the District in the name of the licensee and the District. Where all or part of the bond is forfeited to the City, this money will be deposited into the City's "Green Building Fund". Decision has not yet been made on whether monies provided as a bond will be returned with interest, or whether interest will be retained by the City for the Green Building Fund.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The requirements of the policy are mandatory for all buildings which fall under the building types specified by the ordinance; however, the City is currently considering policies for allowing the Act to be waived under special circumstances, for example where a developer is able to prove that meeting the requirements of the mandate will not be economically or technically feasible. Consensus has yet to be agreed on the direction this will take.

According to Zach Dobelbower, Neighborhood Planning Coordinator at the DC Office of Planning, the City does not yet have statistical data on the total number of new construction projects which fall under the requirements of the Act, though this analysis is currently being undertaken., Since the policy does not include new, privately financed residential developments, its scope and potential uptake within new construction is limited.

2.2. Energy Savings Potential

As yet, no data has been collected or calculated regarding the possible energy savings of the mandate. However, officials at the DC Office of Planning indicated that this exercise will be undertaken shortly. It was also noted by City officials that the purpose of the mandate is not solely focused on energy savings per se, but rather to encourage a shift towards green building practice as a whole. It should be noted that under LEED-NC 2009, EA Prerequisite 2 will require at least a 10% improvement in energy performance to be achieved, compared to ASHRAE 90.1-2004 minimum standards.

According to Stella Tarnay at the Office of Policy and Sustainability, requirements for commercial buildings to achieve an EPA score (as determined by the ENERGY STAR Target Finder tool) were included within the Act as this requires some performance modeling to be conducted in order to ascertain the level of improvement of a building's energy performance when compared to similar buildings in the Commercial Building Energy Consumption Survey (CBECS). It was felt that in doing this, designers would be required to take a more holistic view of a building's energy performance.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

The policy was developed by a task force of approximately 30-40 members, around 3/4 of which was made up of industry representatives who donated their time to the City. Within the City, three members of staff were dedicated full time to overseeing the development of the Act, with an additional two to three dedicating up to 50% of their time for a period of several months. City officials described the development process as challenging, largely due to the number of City departments who were involved in its development. The City established a green building fee and performance bond to build up a green building fund to finance policy development and implementation, as well as to fund an ongoing education program concerning green building in the region. Therefore net costs to the City are minimized as the program is effectively funded by developers.

3.2. Cost to the Developer

Additional costs (though negligible compared to total construction costs), may be borne by developers in the form of additional green permitting fees as follows:

New construction projects	$0.002 per square foot
Alterations and repairs of between $1,000 and $1 million	0.13% of construction value
Alterations and repairs exceeding $1 million	0.065% of construction value

Developers must also provide a performance bond to the City as outlined in Section 1, returnable in full provided the green building mandates of the act are met. Additional costs may also be incurred by developers in order to design and construct buildings which meet the requirements of the mandate. The City does not have detailed information regarding the policy's impact on construction costs. However City official's best estimations are that construction costs have increased by 2% to 3%.

Staff at GreenHOME, one of the organizations that helped to form and support the Green Building Legislation Task Force, particularly with a view to affordable housing, believe that it is almost impossible to pin down the cost of green building, due to the wide variation in type, size and cost of new construction projects. It was noted that, while it would be possible to cost "spec list substitutions" required for green building design, this did not reflect the actual process, as an integrated design approach is more important to achieving the sustainable goals of a project than simple equipment substitution.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The policy is administered jointly by the DC Department of the Environment and the Department of Consumer and Regulatory affairs, with assistance from a number of other City departments including the Department of Housing and Community Development and the Office of Policy and Sustainability. The Institute for Market Transformation (IMT), an organization involved in market research, educational outreach, and the creation and coordination of program initiatives for green building and environmental protection in the US was contracted by the City to assist in the development of the code and advise on best practices for code amendments.

The act requires that where requirements for LEED compliance are included, certification must be achieved with the USGBC. ENERGY STAR scores are determined through the externally administered ENERGY STAR Target Finder tool. However, review of the compliance process is subsequently undertaken by the district staff. As Green Communities ratings are not verified by a 3rd party certification body, the City expects that additional review of Green Communities scores will take place, though no final decision has been reached of the exact process.

4.2. Ease of Initiation

In order to get the code passed by DC government, the Green Building Legislation Task Force was required to coordinate testimony at policy hearings, educate council members on the intricacies of green building design, bring in experts from other cities and gather support from the stakeholder community. Patty Rose, Executive Director at GreenHOME, noted that without having the DC Building Industry Association (DCBIA) 'at the table' when the policy was being developed, the bill would have never been passed in the City. Maribeth DeLorenzo, Washington DC Department of Housing and Community Development, concurred, noting that conducting facilitated meetings with Task Force members provided a critical vehicle for reaching agreement with the building community on some of the more contentious policies within the Act.

In order to reduce the immediate burden on the building industry within the City, the requirements of the code will be phased in over several years. City officials noted that, by doing this stakeholders would have significant time to prepare for each step up in the mandate's requirements, a key requirement in getting the bill signed into law.

4.3. Educational Outreach Requirements

By establishing a green building fund alongside the Act, the City established a source of income which will be used, in part, to fund programs to educate members of the construction industry, stakeholder groups, organizations and individuals who want to learn about green building. Both City agencies have conducted outreach work on areas of the Act which fall under their field, making costs difficult to track; however, officials described the requirements as "extensive". A wide range of tools have been used for education and outreach work, including formal training sessions, stakeholder "needs meetings" and neighborhood advisory committees.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Developer

The Green Building Act was developed by the City's Green Building Legislation Task Force. Throughout the development process, the task force used focus groups and facilitated meetings in order to build support and achieve consensus on the requirements of the act for a broad range of stakeholders, including developers, builders, design professionals and environmental and affordable housing communities. According to staff at GreenHOME, lining up support from key stakeholders and the members of the community (in particular the DCBIA) was critical in streamlining the process and ultimately in getting the act passed by City government.

GreenHOME staff noted that the larger "Class A" developers in the City were not resistive to the implementation of the Act as they were already 'on board' with green building, based on the realization that the industry was already moving in that direction. The most resistance came from smaller developers, who were opposed to the perceived increase building costs that the Act would bring about. City officials agreed that there was some initial opposition to the Act from developers concerned with increases in building costs and a lack of green building knowledge capacity, both in the industry and within the City government.

6. REFERENCES

Maribeth DeLorenzo, Washington DC Department of Housing and Community Development

Zach Dobelbower, Neighborhood Planning Coordinator at the DC Office of Planning

Patty Rose, Executive Director, GreenHOME

Stella Tarnay, Washington DC Office of Policy and Sustainability

CASE STUDY: SAN FRANCISCO GREEN BUILDING ORDINANCE

1. THE POLICY

Signed into law in August 2008, San Francisco's Green Building Requirements Ordinance was developed from a task force on green building set up by the Office of the Mayor in 2007 to study and develop green building proposals for the City. The policy will impose green building requirements on all newly constructed buildings in the City when it comes into effect in November 2008 (90 days after enactment of the Ordinance).

Based on the recommendations of the task force, the San Francisco Building Code was amended to include the "Green Buildings Requirements Ordinance", as Chapter 13C of the regulations. The requirements of the ordinance will be phased in, taking full effect in 2012. Although implemented within the City's building codes, the policy is considered a green building mandate as opposed to a green building code as its requirements are tied to 3rd party standards which are not governed by San Francisco's own codes. In addition, not all building projects fall under the requirements of the act as its reach is dependent on building size and type.

Commercial Building Requirements
The ordinance requires that all new commercial office buildings over 25,000 sq ft meet the minimum requirements for LEED® certification. In 2009 this requirement will be increased to a LEED Silver rating, further increasing to LEED Gold by 2012. In addition to requiring overall LEED certification, the ordinance mandates that a number of credits must be achieved, on top of the prerequisite credits of the LEED scheme. The credit requirements will be phased in through 2012 and will cover water efficient landscaping, water use reduction, construction debris management, enhanced commissioning and storm water management. (Note that actual certification is not required, see section 4.1.)

Renovation projects of over 25,000 sq ft with significant upgrades to structural, mechanical, electrical or plumbing systems must submit documentation to demonstrate LEED "Certified" Certification is achievable (or has been achieved). From 2010, LEED Silver certification must be achieved and from 2012, LEED Gold. Mid-size office buildings between 5,000 and 25,000 sq ft do not have to meet a LEED rating, but a LEED checklist must be completed. From January 1st 2009, 5 specific LEED credits must be included within that checklist, (none of which pertain directly to energy use) with further increases in credit requirements related to water-efficient landscaping, water-use reduction, construction debris management, and energy use introduced in 2011 and 2012.

Residential Building Requirements
Under the ordinance, high-rise residential buildings (taller than 75 ft) must meet the certification requirements for LEED "Certified", or 50 points under the Green Point rating scheme. After 2009 LEED Silver, or 75 Green Points, must be achieved. In addition to the LEED certification requirements, a number of specific credits must be achieved, in addition to the prerequisite credits of the LEED scheme. As with large commercial buildings, the additional credit requirements will be phased in through 2012. Starting in November 2008, single family and mid-size residential housing must submit a Green Points Checklist; however, there is no minimum points requirement. From January 2009 25 points must be achieved, increasing to 50 points in 2010 and 75 points in 2012.

Projects where demolition is taking place
Where demolition of existing buildings takes place, the number of green rating points (LEED or Green Points) which must be achieved increases by 10% of the *required points total*. Where the demolition is of a historic building, an additional 10% of the *total possible points* (i.e. an additional 7 points for LEED) must be achieved. Significantly increasing the density of the development area reduces the increased number of additional points required.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The requirements of the policy are mandatory for all buildings which fall under the building types specified by the ordinance. While San Francisco does not currently have any detailed information on the number of projects

expected to fall under the requirements of the policy, the anecdotal evidence indicates that the policy will encompass the majority of new construction projects in some form, particularly as, unlike the Washington DC Green Building Act, the policy also includes requirements for private residential projects.

2.2. Energy Savings Potential

According to the findings of the Task Force on Green Building for the City and County of San Francisco, the cumulative benefits of the ordinance through 2012 are projected to be: CO_2 emissions will be reduced by 60,000 tons, 220,000 MWh of power will be saved, 100 million gallons of drinking water will be saved, wastewater and storm water will be reduced by 90 million gallons, construction and demolition waste will be reduced by 700 million pounds, the value of recycled materials will be increased by $200 million, the number of automobile trips will fall by 540,000 and green power generation will be increased by 37,000 MWh. It is recognized by City officials that these are only approximate estimations of the savings the policy will achieve, based on "unscientific" calculations carried out by the City's Department of Planning.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

The City does not have specific data regarding the cost of implementing the policy; however, anecdotal evidence from City staff suggests the additional costs for the program were not unduly high as the policy was integrated into the existing City infrastructure. Biweekly meetings were held by the project committee, comprising seven representatives from the Mayor's Office, the Department of the Environment, the Department of Building Inspection and the Department of Planning, as well as 10 industry representatives. Training to City staff was provided by the Chief Building Official over the course of a month, regarding the requirements of the act and its impact on building enforcement and policy administration. In addition, three workshops were held by the Department of Human Resources with city staff on the codes requirements. An external consultant was also hired to conduct an energy cost effectiveness study required for approval by the California Energy Commission at a cost of $12k.

3.2. Cost to the Developer

A number of sources were used by the City to determine the economic impact of the proposed legislation prior to its implementation. Studies in 2004 and 2006 by Davis Langdon showed "that there is no significant difference in average costs for green buildings as compared to non-green buildings". Anecdotal evidence provided to the City indicated that the cost of achieving LEED certification was unlikely to unduly stretch large City developers as they are already targeting LEED Gold certification at a minimum. The requirements for smaller and medium sized projects (i.e. those less then 25,000 sq ft) are less onerous than for larger commercial developments (initially requiring only a LEED checklist to be completed). Because of this, it was noted by City staff that no significant feedback was received from smaller developers.

According to City officials, the cost to a developer of achieving LEED Gold Certification ranges from 2% to 5% of project hard costs. Matarozzi/Pelsinger Builders puts the additional cost of pursuing LEED Gold Certification at approximately 2.0 to 2.5%.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

While the LEED and Green Point rating systems are referenced in the Green Building Ordinance, actual certification is not required. In lieu of a LEED or Green Point application, a 3rd party reviewer will be used to certify that the credits have been met. Reviewers must be licensed design professionals who have been involved with at least 1 LEED certified project. It is hoped that the City will be able to maintain a list of 3rd party reviewers; however, definitive agreement has not yet been reached on the approach that will be taken. Projects where a 3rd party reviewer is used to demonstrate compliance are likely to undergo a higher level of review by the City compared to those which are certified through the USGBC.

The City expects most projects to follow the process to achieve LEED Certification with the USGBC, as anecdotal evidence suggests the majority of large commercial building projects in the City are already striving for LEED Gold Certification. Furthermore, it is unlikely to be financially advantageous to pursue a 3rd party review process,

as the cost of doing so is comparable to that of achieving full certification.

4.2. Ease of Initiation

The Ordinance was developed with input from the Mayor's Green Building Task Force, which was comprised of developers, contractors, consultants and building owners. The majority of policy development was conducted by the Task Force; however, external consultants were contracted to undertake a cost effectiveness study, a requirement of the state of California for any jurisdiction wishing to exceed the state energy policy requirements. In order for the City to demonstrate the cost effectives of a policy, it must be shown that the various measures being proposed that exceed state policy requirements will both save energy, as well as provide payback to developers in a reasonable period of time.

Officials at the City believe that the Task Force approach to initiating the policy was crucial in its implementation, as this meant the policy was developed in conjunction with the ultimate practitioners of the policy, thus helping to reduce the likelihood that the policy would have adverse impacts on the stakeholder community. Furthermore, the decision to phase in the policy through 2012 should mitigate its immediate impact on stakeholders. Incorporating stakeholder interests in these ways resulted in little opposition to the policy prior to its implementation.

4.3. Educational Outreach Requirements

As part of the implementation process, the City will be holding at least 16 public training sessions to provide an overview of the policy and its implications on the permitting process. These will largely focus on the administrative requirements, such as the 3rd party review process. Officials at the City recognized that there was already a large LEED Accredited Professional community within the City who would be responsible for assisting new construction projects in achieving compliance. The City also hopes to partner with the USGBC and the Green Building Certification Institute in developing more specialist training sessions aimed at demonstrating how to comply with the technical requirements of meeting each level of LEED certification.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Building Community

According to city officials, the task force was crucial to its success, allowing for input for input from key individuals representing a broad spectrum of the building industry that refined the policy throughout its development. The requirements for introducing new legislation in the City required that the code pass through the Green Building Subcommittee, Code Advisory Committee, and the Building Inspection Commission before final hearings at the County Board of Supervisors which meant that the policy had to undergo significant review before being presented to the City for approval. As part of this process changes included dropping requirements relating to laboratories and low income housing following stakeholder concern that achieving the policies would not be realistic. Ultimately however, the task force process reduced the policy approval time and meant that the draft put forward for implementation was adopted without additional revisions. Officials suggested that stakeholders were most interested in having clarity in the policy requirements, and that areas of vagueness were those most likely to come up against opposition, for example clarification of occupancy classes covered. City officials noted that as most commercial developers in the City were already targeting high levels of LEED certification, additional construction and development costs to meet the requirements of the act would be minimized.

City officials also noted that the task force was conscious of not imposing overly onerous or unachievable requirements on the building community. The phased implementation process which was adopted therefore allows builders and developers time to prepare for each step increase in the policy's requirements. This, along with the task force approach for policy development helped to negate any fundamental concern over the implementation of the act. It was also noted that the 18 month implementation process of the policy helped to create a green building "buzz" which assisted in preparing the industry for the policy's implementation.

6. REFERENCES

Richard Chien, City of San Francisco Private Sector Green Building Coordinator

Dan Pelsinger, Developer, Matarozzi/Pelsinger Builders

Green Building Code

DESCRIPTION

A green building code would directly modify the City's building codes to introduce greater emphasis on sustainability, energy reduction, and climate change goals within all relevant sections of the codes, to capture potential savings and improvement in all aspects of a building's design, construction and operations. Since all new construction and major renovations would be required to meet the code requirements, this would force a wholesale shift towards green building for all construction in the City.

POLICY OBJECTIVE

The objective of a Green Building Code is to introduce a wholesale redefinition of applicable building codes to require all new construction and major renovations to meet green building requirements, including specific requirements for all aspects of a building's design that could affect energy performance.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★★★★★	COST EFFECTIVENESS	★★★
ECONOMIC BENEFIT	★★★★★	ADMINISTRATIVE FEASIBILITY	★★★
COST OF IMPLEMENTATION	★★★		

ENERGY EFFICIENCY POTENTIAL ★★★★★

Long-term energy savings potential is high on a project scale. The overall impact on energy efficiency within the City is dependent on the specific mandatory requirements of the policy.

- **Energy savings potential:** Energy savings potential is tied to the specific requirements of the green building code. No specific energy improvements are mandated by compliance with ASHRAE Standard 189.1, however energy modeling has indicated compliant buildings are likely to be between 10% and 40% (with an average of 25%) more efficient than ASHRAE Standard 90.1-2004 buildings. Through a green building code, specific energy reduction targets could be provided to comply with Architecture 2030 goals, provided that the technical requirements of meeting such standards are economically feasible for developers in the City. This could either be done by mandating a performance based route for energy compliance or through the provision of mandatory standards which would be expected to achieve energy performance targets in line with Architecture 2030. Where green building codes include provisions for energy codes or energy use reduction the same standards may be applied to both the green building and energy codes, thus yielding equivalent energy savings potential performance.
- **Cumulative Energy Savings:** This policy would generate energy savings of between 1,600,000 and 1,900,000 MWhr through 2030, assuming a 20% improvement in energy efficiency for 70% of new development within the City (assuming 30% of new development in single family residences which may be exempt from the code).
- **Applicability to 2030 Challenge targets:** To meet the 2030 Challenge Goals, a green building code would have to include specific energy requirements and set a timetable to achieve specific energy reduction targets in line with the 2030 Challenge.

ECONOMIC IMPACTS ★★★★★

Excellent potential for job creation as all new construction projects would fall under the requirements of the code, forcing a wholesale shift towards green building in the City.

- **Job creation potential:** A mandatory green building code would drive a wholesale move towards green construction practices in the City. As such, it is likely that new jobs would be created in all aspects of green building design and construction. This is corroborated by officials at the California Energy Commission and California Building Standards committee, who expect that in locations where compliance with the California Green Building Code is mandatory, jobs will be created in all areas of green building design. Officials from the ASHRAE Standard 189.1 Project Committee believe that implementation of Standard 189.1 will have a similar effect although they also noted that the extent to which new jobs will be created is largely dependent on the green building requirements in the City, and the current supply of qualified green building professionals and trade workers in the City.
- **Policy enforcement:** Where existing green building policies already exist, officials have noted that policy enforcement is crucial to a policy's real world success. Despite this, enforcement is an area often overlooked or poorly

administered. Strong policy enforcement in Seattle could lead to the creation of numerous jobs through the creation of a green building inspection and enforcement industry within the City.

- **Overly stringent policy could negatively impact real estate market:** Increased costs to developer would either get passed on to consumers or eat into profit margins, either of which could adversely impact the real estate market.

COST OF POLICY IMPLEMENTATION ★★★

Costs to the City in implementing an existing 3rd party green building code, such as ASHRAE Standard 189.1 would be dependent on the number of amendments which must be made to existing standards.

- **Cost to the City:** Implementation costs to the City are largely dependent on the changes which would have to be made to the existing building codes, or to the 3rd party green building standards such as ASHRAE Standard 189.1. As Seattle already has a comprehensive set of building standards which include green policies, implementing a 3rd party code would require a review to ensure the two codes are in alignment. Initial analysis performed by the Seattle City officials suggests that this would be a significant undertaking. As neither the California Green Building Code nor ASHRAE Standard 189.1 has been implemented in any local jurisdiction, costs of policy adaptation are difficult to predict. Anecdotal evidence however suggests that whilst some aspects of policy administration and enforcement could be integrated into the existing building inspection department infrastructure, additional staff training would need to take place to ensure officials fully understand the code requirements. Additional staff may also be required in order to meet the increased administration and implementation workload, particularly in the period immediately prior to and following the code's implementation. Whilst implementation costs are likely to be high, once introduced, ongoing policy development costs to the City are likely to be manageable as updates would conducted in line with the City's existing cyclic code review process.
- **Cost to the developer:** Green building code compliance is likely to result in cost increases for the developer in order to make buildings compliant with the more stringent requirements of the code. The magnitude of the cost is dependent on the specific requirements of the code. Compliance with the California Green Building Code is expected to increase construction costs by between 2 and 3% (equivalent to achieving LEED® Silver certification). The SSIM building energy model estimated the cost of achieving a 20% energy efficiency improvement at 2.1% of project cost.

COST EFFECTIVENESS ★★★

The cost-benefit analysis indicates that the program would be effective for the City, though developers will experience some financial burden in complying with the standard at initiation.

- **Direct City Benefit Cost ~9:** $9.00 of energy savings per $1.00 of program costs to the City. This ratio is quite high due to the comparatively low cost to the City of administration and policy development compared high energy savings over time.
- **Net Benefit Cost ~0.2:** $0.20 of monetized energy savings and financial benefit to developer for every $1.00 of costs to the City and developer. This ratio is low due to the large financial investment required on the part of developers to comply with the standard (the cost of code compliance will likely decrease with time and developer experience), with little corresponding financial benefit to the developer in terms of additional rents or offset costs.
- **Cost per MWhr saved low:** ~$5.10 per MWh saved.

ADMINISTRATIVE FEASIBILITY ★★★

Using an externally developed green building code, such as ASHRAE Standard 189.1 would ease the administrative burden on the City.

- **Review of existing building standards must be undertaken:** In implementing a 3rd party standard, such as ASHRAE Standard 189.1 a comprehensive review of the compatibility of existing building standards with the 3rd party code must be undertaken. Officials involved in the development of the California Green Building Code reported that, had Standard 189.1 been available at the time of the code's writing, the standard would have been referenced throughout in order to reduce the confusion which may arise from the existence of multiple green building codes. This is expected to be the case with future developments of the code. However it should be recognized that ASHRAE Standard 189.1 is still in development and its date for final publication is currently unknown.
- **Washington State building standards may conflict with green building code requirements:** which may limit the scope of a proposed green building standard, particularly in the residential sector where approval would be required at State level for any changes to residential code requirements. The administrative burden on the City would be significantly eased were the State to adopt a green building standard within its codes.

STAKEHOLDER IMPACT

- **Project costs would increase in order to achieve compliance with code standards:** If the cost of compliance is prohibitively high, the developer community would be adversely impacted.
- **Opposition may be felt regarding the implementation of specific standards within the code:** Some elements of

the building industry in the City, such as the smaller developers and multi family residential developers who may feel burdened with the additional costs incurred through complying with a green building code. Officials at the California Building Standards Commission also highlighted the need to be prepared for opposition to certain policies, particularly those relating to land use which the developer community felt were neither nor workable within a building code

- **The design community (beyond those normally engaged by Seattle developers to deliver green buildings)** would also need to be on board with the requirements of the code in order that they could be fully prepared for its implementation. .

LESSONS LEARNED

PROS

- Cost effective policy – low program costs for the energy savings benefits, though high cost to developer.
- Will result in a wholesale move towards green building in the City.

CONS

- Existing Seattle building standards will need to be reviewed.

CONSIDERATIONS IN POLICY DESIGN

- Stringency of building requirements and the associated level of financial burden to impose on the developer industry?
- Should mandatory requirements be phased to reduce the economic / administrative burden on the City & developer?
- Will policy requirements contradict with State building code requirements? Should a green building code be adopted at State level prior to local implementation?
- If achieving exemplary green building performance is required across the board for all construction, how would we continue to promote the development of truly exceptional buildings to drive innovation?
- Suggestions for improvements to the Washington State Codes end on 31 March 2008 (for the next 3 year cycle). Therefore changes which may be affected by state policy should be submitted before this date.

CASE STUDY: ASHRAE STANDARD 189.1 GREEN BUILDING CODE

1. THE POLICY

ASHRAE Standard 189.1, "Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings," is currently being developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) along with the Illuminating Engineering Society of North America (IESNA) and the U.S. Green Building Council (USGBC). A complete draft of the standard was first made available for public review in May 2007 and again in March 2008. In October 2008, the ASHRAE Standards Committee voted to disband the current ASHRAE 189.1 project committee. Although ASHRAE indicted to previous project committee members that they hope to revive the project shortly, a date for its final publication is as yet unknown. Although the Second Public Review Draft of Standard 189.1 can be used for reference, it is unlikely that Seattle would be able to reference a completed version of Standard 189.1 in the near future.

The standard was developed for inclusion into building codes across the US, in addition to a wider audience including cities, developers, corporations and institutions who wish to set green building design standards for their construction projects. The standard is designed to provide minimum guidelines for green building practices, including minimum requirements for the design of sustainable buildings to balance environmental responsibility, resource efficiency, occupant comfort and well-being, and community sensitivity. It is intended that the growing number of cities, states and organizations which use a green building rating system will adopt Standard 189.1 as a baseline for sustainable design. Although not a green building rating system, the standard addresses the five key areas of green building as addressed by the LEED® green building rating system, often with options of prescriptive or performance based routes to prove compliance:

Sustainable Sites
Mandatory provisions include consideration of site selection, site development, heat island mitigation and light pollution reduction.

Water Use Efficiency
Mandatory provisions include site water use reduction, building water use reduction and water metering.

Energy Efficiency
Energy systems within a building must be designed to comply with the mandatory Energy Efficiency provisions, including the use of on-site renewable energy systems with a peak generating capacity of at least 1% of the electrical service load of the building and the provision for energy metering.

The Building's Impact on the Atmosphere, Materials and Resources
Compliance is demonstrated by diverting a minimum of 50% of non hazardous construction and demolition debris from landfill, and providing easily accessible areas dedicated to the recycling of non hazardous materials. In addition, either the prescriptive (reduced-impact materials to either have 10% recycled content, be 15% regionally processed or be 5% bio-based) or performance based compliance route (life cycle assessment of 10 different atmosphere, materials and resource factors, of which at least two must show an improvement) must be followed.

Indoor Environmental Quality
Requirements for indoor environmental quality include: indoor air quality, environmental tobacco smoke control, outdoor air delivery monitoring, thermal comfort, building entrances, acoustic control, daylighting, and low emitting materials.

Additional Requirements
Additional requirements within the code relate to building commissioning, building acceptance testing, measurement and verification, energy use reporting, durability, transportation management, erosion and sediment control, construction, and indoor air quality during construction.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The standard has been developed to provide guidelines for green building practices and is not yet mandatory in any jurisdiction. It is expected that a number of cities, states and organizations which use a green building rating

system will adopt Standard 189.1 as a baseline for sustainable design. Policy uptake within any jurisdiction would depend on the requirements placed by that area on complying with the standard; however, in most cases it is expected that compliance with some or all of the code would be mandatory for all new construction projects.

2.2. Energy Savings Potential

Standard 189.1 does not mandate any specific requirements for absolute or relative energy improvement. Therefore the energy savings potential of compliance with the standard is difficult to predict, as the standard does not easily allow for specific energy performance targets to be mandated. The level of energy savings achieved is dependent on the type of building, its architecture, construction and HVAC systems. Analysis has been conducted by the National Renewable Energy Laboratory (NREL) on a study of 17 building types, which saw improvements in energy efficiency of between 10% and 40% (with an average of 25%) for Standard 189.1 compliant buildings, compared to the Standard 90.1-2004 compliant equivalent.

3. COST OF IMPLEMENTATION

3.1. Program Cost

The cost to a city or organization to implement Standard 189.1 is largely dependent on the changes and amendments which must be made to the code in order to implement the standard within a jurisdiction's existing building code. Since the standard itself was developed by a team of individuals operating on a largely voluntary basis, development costs are unavailable. As the standard is yet to be released in its final form, data is not yet available for the cost of implementing or enforcing the policy. However, anecdotal opinion was provided by officials at the Standard 189.1 Project Committee.

Where cities have comprehensive existing green building codes and building standards, work must be undertaken to integrate the standards outlined in Standard 189.1 with those already in existence, which is likely to increase implementation costs. Enforcement costs are likely to be lower as much of the existing building standards compliance infrastructure may be in place to oversee the requirements of the standard. Conversely, where no comprehensive standards already exist, implementation costs are likely to be lower as fewer amendments will need to be made to existing standards and to Standard 189.1. In this scenario, enforcement costs will be higher, as new infrastructure will need to be implemented to oversee compliance.

3.2. Cost to the Developer

As the standard has not yet been released in its final form, costs to the developers for achieving code compliance are currently unknown. Some research has been conducted which indicates that compliance with the standard is approximately equivalent to achieving LEED "Certified" certification; however, there is contradictory evidence as to the actual increase in costs this is likely to bring about. It would not be unreasonable to expect building costs to increase by between 1% and 2%.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The standard has been developed jointly by ASHRAE, USGBC and IESNA and is designed to provide minimum guidelines for green building practices. Implementation of the code would fall under the requirements of existing local building standards authorities and enforcement of the code by local building departments.

4.2. Ease of Initiation

The ease of initiation of the code, as with program costs, is dependent on the extent to which high performance building standards and green building codes are already implemented. In a city like Seattle, with comprehensive existing building codes and green building standards, amendments will have to be made to the existing building codes or to Standard 189.1, to insure that contradictory or differing building standards are not introduced,. As an example, amendments may have to be made to Standard 189.1 to ensure that its "Water Use Efficiency" requirements are in line with the plumbing requirements of existing code. Once implemented, however, enforcement of the code is likely to be much easier, as compliance with the code will be overseen by the existing building department.

4.3. Educational Outreach Requirements

A number of presentations have been conducted by USGBC, AHSRAE and IESNA as development of the code has progressed. In addition, a number of presentations on the code have been given at several national construction industry conferences.

Officials involved in the writing of the code expect significant education and outreach requirements to be provided by each jurisdiction following adoption of the standard. ASHRAE is currently developing a training package on the overarching requirements of Standard 189.1, which is expected to be offered to authorities and organizations implementing the standard. Though current outreach costs are unknown, they are likely to be in the order of tens of thousands of dollars. The Standard 189.1 Project Committee expects that jurisdictions adopting the standard will also need to deliver targeted training for those impacted by each requirement of the code.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to Interest Groups

A host of interest groups are involved in the development of Standard 189.1, to insure that the standard meets the sustainable, economic and practical requirements of stakeholders when released. This notwithstanding, local stakeholder involvement will be required in order for it to be successfully implemented at the local level.

As the standard has yet to be released in its final form (and therefore been implemented by any jurisdiction) historical data regarding its acceptability to local interest groups is unknown. It is expected that developers and builders would be impacted through required changes to their building practices, with increased costs incurred through the cost of building Standard 189.1 compliant buildings. Conversely, it is expected that the standard would have a positive impact on sustainability consultants and designers, as well as those involved in the supply of green building products and process as the implementation of Standard 189.1 in any local jurisdiction would help to catalyze a wholesale move towards green building.

Officials on the Standard 189.1 Project Committee were conscious that an undue burden should not be placed on developers. Therefore, there was a concerted effort to ensure that the requirements of the standard are both technically and economically feasible for the building community, with current technologies and design and build practices.

According to Jim Logan at Jim Logan Architects in Boulder, Colorado, where the standard is currently being considered for implementation, the majority of the building community, while resistant to the perceived building development increases that the implementation of such a code may bring, recognize that the move towards green building is an inevitable step, particularly if this is mandated by forthcoming future federal legislation. As such, he believes that there is excitement to learn how to design code compliant buildings.

6. REFERENCES

John Hogan, Chair of Standard 189.1 Project Committee, Senior Energy Code Analyst for Seattle

Jim Logan, Jim Logan Architects, Boulder, Colorado

CASE STUDY: CALIFORNIA GREEN BUILDING CODE

1. THE POLICY

In July 2008 California introduced the first statewide green building code, which will come into effect in January 2009 and will help California achieve its goal, mandated in Assembly Bill 32 and signed into law in 2006, of reducing the state's greenhouse gas emissions to 1990 levels by the year 2020. The code is designed to set the minimum requirements for green buildings in California and was developed in order to provide a consistent, statewide approach for green building within the state, which should reduce the confusion surrounding the number of green building programs available to developers and builders.

Although currently voluntary under state law, the code was written in "code language" in order that local jurisdictions could easily implement it into local building standards. Beginning in 2010 parts of the code may become mandatory under state law for all new building design and construction projects in the state. The current Green Building Standards will also be reviewed and updated within a new rulemaking process before any mandatory requirements are established. Some state agencies think that making compliance with the code mandatory will limit its scope, and that achieving exemplary green building performance in all new construction projects will be unrealistic. Therefore, it is expected that areas of the code will always be voluntary, in order to avoid the "mandatory green washing" of all buildings in the State and to allow truly sustainable buildings to excel. This approach is designed to help drive forward sustainable design in the State through the construction of fewer, but truly exceptional sustainable buildings. As implemented, compliance with the code is likely to be comparable to achieving a "LEED® Silver" rating.

The code is designed to improve public health, safety and general welfare by enhancing the design and construction of buildings, through the use of building concepts which have a positive environmental impact, and by encouraging sustainable construction practices in the following areas:

Planning and design
Design and development standards cover environmentally responsible site selection, building design, building siting and development in order to protect, restore, and enhance the environmental quality of the site and respect the integrity of adjacent properties.

Energy efficiency
Energy efficiency standards demonstrate an enhanced level of building efficiency using a performance based approach or prescriptive approach.

Water efficiency and conservation
Water efficiency and conservation standards help to reduce indoor and outdoor water use and wastewater conveyance through the reduction of potable water use in water fixtures, the reduction or elimination of potable water use for irrigation and the use of recycled rainwater or grey water.

Material conservation and resource efficiency
The standard requires reusing existing building stock and materials, the use of recycled, regional, rapidly renewable and certified wood materials and the employment of techniques to reduce pollution through the recycling of materials and reduction of building pollutants.

Environmental air quality
Environmental air quality standards quantity airborne contaminants that are odorous, irritating or otherwise harmful to the comfort and well being of a building's installers, occupants and neighbors.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The code was written in a way that allows it to be easily implemented into the building standards of local jurisdictions within the state. The level of uptake of the code is therefore largely dependent on the number of local jurisdictions which make compliance with the code mandatory. This figure is currently unknown, although the Building Standards Commission indicated that they had so far has interest from a handful of local jurisdictions. For any single jurisdiction that does adopt the code, all new construction projects would be required to comply with its mandatory provisions.

2.2. Energy Savings Potential

As implemented, the impact of the program on overall energy saving in new construction is likely to be limited as compliance with the code is voluntary under State law. However, the overall energy savings achieved through the implementation of the code will be dependent on the number of local jurisdictions which make compliance mandatory. For those that do, the code is designed to achieve a minimum of a 15% improvement in energy use over Title 24 mandatory standards (Tier 1), with a desired target of exceeding current California Energy Code requirements by 30% (Tier 2). Thus, energy savings for new construction projects will be at least 15%.

3. COST OF IMPLEMENTATION

3.1. Program Cost

Exact figures for the cost of developing the code are unknown by the state as the time and costs were incorporated by the state agencies as part of their code development program. However, according to officials at the California Building Standards Commission, the costs associated with implementing the code were minimal, largely as the code was developed as part of the State's cyclic 18 month renewal program. In addition, as the USGBC's LEED rating program was used as the basis of the code, the research and development effort required to implement the code was minimized, although in areas the code covers elements not within LEED. No additional members of staff were required during the development period; instead, code development was incorporated into the duties of existing staff; none of whom worked on the project on a full time basis.

Where local jurisdictions within the State make compliance with the code mandatory, additional enforcement costs (in addition to the costs of integrating local codes with the State's Green Building Code) are likely to be incurred in enforcing the code due to the additional elements that will have to be reviewed as part of the enforcement process. As no individual jurisdictions have yet made compliance with the code mandatory, exact figures for implementation costs are unknown, though it is expected that local staff would need additional training on code enforcement, compliance and policy administration.

3.2. Cost to the Developer

Extensive life cycle cost analysis was not undertaken during the writing of the California Green Building Code as compliance with the code is only voluntary. The same rigor was, therefore, not applied to assess its cost effectiveness as would have been required for a mandatory code. It is expected that as the code is reviewed, updated and developed further, particularly towards the 2010 version of the code, more thorough life cycle costing and cost effectiveness analysis will take place. Funding is expected to be acquired to allow this to take place.

According to representatives of California Building Standards Commission compliance with all measures within the code is likely to be comparable to achieving LEED Silver certification, which carries with it an estimated cost of compliance likely in the order of 2 to 3% of total construction costs.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The code will be administered by the California Green Building Standards Commission in conjunction with the California Department of Housing and Community Development and the California Energy Commission. Enforcement of the code will be overseen by local building departments.

4.2. Ease of Initiation

The program did not require significant policy research and development or stakeholder impact (in part, as compliance with the code is currently voluntary) prior to its implementation. The state deliberately used the US Green Building Council's LEED green building rating system as the basis for the code, as the requirements of the LEED program had already being validated in the public domain. According to state officials, if ASHRAE Standard 189.1 had already been adopted prior to the writing of the code, Standard 189.1 would have been frequently referenced. With further developments of the code, this is expected to be the case. In total, approximately 30 members of state agency staff were involved in the development of the code; however none of these were dedicated to the project full time.

The ease of initiation on local jurisdictions that make compliance with the act mandatory is largely dependent on the existing local building code requirements and enforcement practices. By implementing the code at State level

(albeit in voluntary form) however, the requirements of implementing the code at a local are significantly lessened as local codes will ultimately refer back to State level policies which are already in line with the code requirements.

4.3. Educational Outreach Requirements

Where individual jurisdictions make compliance with the code mandatory, it is expected that they would implement an education and outreach program for stakeholders and interest groups. It is expected that an education program may be created in association with CALBO (California Building Officials) which have previously provided much of the State's training on new building standards.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Construction Industry

California Building Standards Commission officials found that, while developers were generally supportive of the development of the code, the code would not be released if the requirements on developers and builders were too radical. Including developers in the policy development process allowed them to exert some influence over the policy design, according to the Standards Commission. This was corroborated by Rob Hammon of Consol Energy Consultants, who was involved in the development of the code as a representative of the California Building Industry Association. Hammon also noted that the industry was generally interested in green building and that the development of the green building code was generally well accepted. Developers have raised concerns however, that a possible increase in construction costs to comply with the code would create a disparity between the cost of new and existing buildings. This would affect leasing and sales prices, which could compromise the marketability of new buildings versus existing buildings.

Although the stakeholder consultation process was not as rigorous as is the case for many mandatory building codes, feedback from developers, builders, and other parts of the building construction industry was sought during the development process. Opposition from stakeholders was experienced over several areas of the code, which ultimately resulted in the removal of some standards from the draft that was eventually adopted by the State. In particular, requirements relating to land use planning were removed late in the process, as developers objected to land use decisions being mandated in a building code. In addition, requirements relating to the urban heat island effect were removed due to opposition over concerns of the technical and economic feasibility of meeting heat island requirements in all buildings. If and when compliance with all or parts of the code becomes mandatory, it is expected that the code would be updated with significantly more stakeholder participation in the process.

It was considered important that the opinions of as many interested parties as possible were obtained in developing the code. However, state officials noted that it was often difficult to predict last minute opposition from stakeholder groups who had previously been thought to be in agreement with policies within the code. With further revisions, officials hope to better prepare for the unexpected, ensuring that potential controversial issues are identified and addressed as early in the process as possible.

6. REFERENCES

Martha Brook, California Energy Commission

Jane Taylor, California Building Standards Commission

Rob Hammon, Consol Energy Consultants

Energy Code

DESCRIPTION

Revisions to Seattle's energy code would introduce far reaching energy standards within the City's building codes, directly influencing the amount of energy consumed by new and renovated buildings within the city.

POLICY OBJECTIVE

The objective of an energy code is to require all new construction and large scale renovations to meet specific targets relating to the building's energy performance, thus directly influencing the energy saving potential of buildings in the City.

SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL	★★★★★	COST EFFECTIVENESS	★★★
ECONOMIC BENEFIT	★★★★	ADMINISTRATIVE FEASIBILITY	★★★
COST OF IMPLEMENTATION	★★★		

ENERGY EFFICIENCY POTENTIAL ★★★★★

Long-term energy savings potential is high as increased energy performance standards in an energy code will cover all new and major renovation projects in the City.

- **Energy savings potential:** The energy savings potential of a new building code is high as energy code standards would cover all new construction and major renovations in the city. This is particularly true where a performance based compliance path is mandated, as specific reductions in a building's energy performance could be set.
- **Performance based code targets:** Setting performance based carbon targets (as opposed to energy improvement targets) would bring Seattle's energy policy in line with the requirements of the 2030 Challenge by explicitly reducing fossil fuel emissions for buildings. Setting carbon targets could also take into consideration source energy use, which would encourage the use of renewables or more sustainable fuel sources.
- **Cumulative Energy Savings:** This policy would generate energy savings of between 1,800,000 and 2,200,000 MWh through 2030, assuming a 20% improvement in energy efficiency for 80% of new development within the City (assuming residential construction is unaffected due to limits established by Washington State law).
- **Applicability to 2030 Challenge targets:** Mandating a performance based route to compliance would allow energy reduction targets to be mapped onto 2030 Challenge goals, as targeted improvements in energy performance could be set to meet the specific requirements outlined in the 2030 Challenge.
- **Construction performance:** By mandating specific commissioning requirements, such as air pressure testing at the completion of a project, the energy code would be able to exert influence over the quality of construction, directly influencing the amount of energy consumed by a building after construction.
- **Post construction performance:** Tying design energy performance to actual post construction energy performance represents a significant challenge. Of the case studies reviewed, England and Wales has the most comprehensive post construction energy requirements. However, these are not tied to pre construction energy performance predictions, primarily due to limitations in the accuracy of energy modeling compared to "real world" energy use.

ECONOMIC IMPACTS ★★★★

Excellent potential for job creation as all new construction projects would fall under the requirements of the code, forcing a wholesale shift toward more energy efficient buildings

- **Job creation potential:** By removing prescriptive compliance paths and mandating a performance based compliance strategy, job creation potential in the City is very high. Similar requirements in England and Wales helped the building industry take a leap in its practices and process, pushing sustainability to the forefront of building design and with it creating a new industry of building scientists, energy engineers and energy assessors. Although more stringent prescriptive requirements will also increase the need for green building specialists and green building product suppliers, they are unlikely to have the same level of job creation potential. By responding to stricter energy codes businesses in Seattle could establish market leadership in sustainable design, which could then be leveraged to develop work such as sustainable engineering or architectural consulting in other jurisdictions.
- **Property Values:** Energy code improvements could be tied to a requirement that buildings track actual performance

and display energy certificates based on metered energy, or on an energy performance rating such as ENERGY STAR. This option is currently being investigated by Cascadia Consulting as part of the City's Green Building Task Force's Existing Buildings Committee. The City could also require energy surveys to be carried out at the point of sale or lease, as required in England and Wales and currently voluntary under California State Law. Survey reports could include an energy performance rating which would highlight areas of energy deficiency. Since the building owner's payback for efficiency improvements has traditionally been limited to the recovery of capital expenditures through lower energy costs, there is often a reluctance to invest in measures with a payback period longer than a few years. The introduction of energy rating certificates would allow the benefits of energy efficiency to be recognized in increased property values, so that the owner need not rely solely on the benefit from reduced operating costs.

- **Policy enforcement:** Enforcement of a comprehensive performance based energy code is likely to place additional burden on city plans reviewers for the assessment of performance calculations, a process which will be unfamiliar to most City staff. Currently the city reviews only a handful of performance based submittals a year. City staff have described the approach as difficult to assess and control, and more open to manipulation than the prescriptive approach; the process requires a detailed assessment of a computer model where tradeoffs may have been made in order to achieve compliance. By comparison, the prescriptive approach involves a more simplistic review of drawings and construction documents. Staff noted that reviewing a building under the performance approach can take up to five times longer than reviewing a comparable building using a prescriptive approach. Therefore, more comprehensive energy code requirements may require additional enforcement staff, particularly if a performance based compliance route or requirements for post occupancy energy evaluations are included. Where other jurisdictions have implemented performance based codes, administration of the code has been described as being "challenging" following the code introduction. With greater experience by enforcement staff, difficulties in enforcing performance codes have diminished, such that the process is now accepted as standard practice by enforcement officials.
- **Policy Stringency:** Increased costs to the developer would either be passed on to consumers or reduce profit margins, either of which could adversely impact the new construction real estate market. Conversely, where more demanding requirements are introduced the costs of the products associated with achieving these code requirements (for example more efficient windows) would ultimately reduce, due to increased demand.

COST OF POLICY IMPLEMENTATION ★★★

Costs to the City in implementing an improved energy codes are dependent on the compliance routes and requirements outlined in the code.

- **Cost to the City:** Implementation costs to the city are largely dependent on the compliance paths available to developers and builders. Currently the Seattle Energy Code is required by City ordinance to include amendments providing a 20% improvement in energy savings over the current version of ASHRAE Standard 90.1 for non-residential construction. It should be noticed that comparing relative code stringency is difficult and particularly for prescriptive codes, relative increases from one code to another may not be achieved for all buildings. Since this periodic review and updating of the Seattle Energy Code is already standard business process, enhancing the prescriptive requirements of the energy code is being done as part of the existing code development cycle and imposes no additional costs. Mandating a performance based compliance methodology for all buildings would impose significantly greater requirements on City staff, with associated cost increases. The costs of implementing Part L (2006) for England and Wales were high compared to City level policy development budgets. However, the City already has an established voluntary performance based compliance methodology within its energy code, thus negating the need to develop a comprehensive new methodology from scratch.
- **Cost to the developer:** Any increase in energy code performance standards is likely to result in cost increases to developers, in order to construct buildings compliant with the more demanding requirements. Based on experiences in California, increases in prescriptive code requirements yielding energy performance gains of up to 20% are likely to increase building costs by approximately 1% to 2%. Mandating performance based compliance would incur additional costs to developers for computer modeling by third party consultants, likely in the region of $40k for complex buildings. For smaller commercial and residential projects, full scale energy modeling may not be financially viable.
- **Post construction performance requirements:** Post construction requirements for demonstrating performance compliance are likely to increase costs to both the City and to developers. The City would be required to develop a methodology for producing energy ratings and certificates, though costs could be minimized if a 3rd party tool such as ENERGY STAR Portfolio Manager is used. Costs for producing certificates or energy ratings would be passed onto the developer or homeowner. Use of ENERGY STAR Portfolio Manager is free for all buildings; however, home energy inspections are likely to cost $200 to $300, depending on the scope and requirements of the survey.

COST EFFECTIVENESS ★★★

The cost-benefit analysis indicates that the program would be effective for the City, though developers will

experience some financial burden in complying with the standard at initiation.

- **Direct City Benefit Cost ~16.4:** $16.40 of energy savings per $1.00 of program costs to the City. This ratio is quite high due to the comparatively low cost to the City of administration and policy development, compared to high energy savings anticipated over time.
- **Net Benefit Cost ~0.2:** $0.20 of monetized energy savings and financial benefit to the developer for every $1.00 of costs to the City and developer. This ratio is low due to the large financial investment required on the part of developers to comply with the standard, with little corresponding financial benefit to the developer in terms of additional rents or offset costs. However, the cost of code compliance will likely decrease with time and developer experience.
- **Cost per MWh saved low:** ~$2.90 per MWh saved.

ADMINISTRATIVE FEASIBILITY ★★★

Enhanced prescriptive requirements could be integrated into the City's existing codes with comparative ease compared to a mandated performance based approach.

- **Administrative feasibility depends on the route to compliance required through the code:** Although a performance based approach currently exists in the Seattle Energy Code for both residential and non residential buildings, mandating this approach would place a significant administrative burden on City officials, particularly in permit review and analysis of performance calculations supplied to the City to demonstrate code compliance. If mandating a performance based approach is seen as likely to place a significant burden on both developers (in terms of costs to demonstrate compliance) and City staff (to review documentation for compliance) an incentive based approach could be used to encourage the use of performance calculations when needed to demonstrate energy efficiency in excess of that which could be achieved through prescriptive compliance alone. Increasing mandatory standard would be a relatively easy process to implement provided improved standards do not contravene Washington State or federal requirements governing limiting values which may be set at a local level.
- **Acceptability of the performance based approach to Seattle:** Seattle City officials report that performance based compliance is generally only used on large and complex construction projects where the analysis can lead to quantifiable improvements in energy performance, with proportionally small modeling costs compared to total project costs. For smaller projects, it is often felt that developers would achieve better energy use reductions by investing computational modeling costs in tangible improvements such as increased wall insulation rather than investing in a performance based analysis. It is thought by City staff that mandating a performance based approach for all buildings may be perceived by developers as introducing unnecessary cost increases by requiring computer modeling, in particularly for small commercial developers and the majority of residential developers
- **Washington State and federal building standards may conflict with increased energy code requirements:** Increasing mandatory standards would be a relatively easy process to implement provided improved standards do not conflict with Washington State or federal regulations limiting values which may be set at a local level. Washington State regulations for residential buildings define "minimum/maximum" limits, governing the maximum performance which can be mandated by local jurisdictions. Some aspects of buildings, such as appliance efficiency standards, are also governed by federal law, where a waiver must be first be obtained in order for the local jurisdiction to exceed federal requirements. Current legal action against Albuquerque's proposed new energy code centers on the City mandating standards which exceed federal law, despite the City also requiring a performance based compliance approach to be followed and therefore not explicitly requiring the standards to be achieved.
- **Post construction performance requirements:** Post construction performance requirements are likely to place an additional administrative burden on City policy makers. Energy rating certificates and rating methodologies may need to be developed directly by the City if 3rd party alternatives are unsuitable or unavailable. Additional staff may also be required in order to meet the increased administration workload of reviewing and approving building energy rating scores and energy survey information provided by 3rd part reviewers.

STAKEHOLDER IMPACT

- **Project costs would increase in order to achieve compliance with improved code standards:** If compliance costs are overly high the development community would be adversely impacted.
- **Opposition may be felt regarding the implementation of specific standards within the code** from some elements of the building industry in the City, such as the smaller developers and multi family residential developers who may feel burdened with the additional costs incurred through complying with improved energy codes. This is particularly likely to be the case with a mandatory performance based compliance route, where the cost and complexity requirements of energy modeling may be considered overly burdensome.
- **Post construction performance requirements:** Developers and homeowners may incur additional costs to meet energy certification or energy survey and energy rating requirements.

LESSONS LEARNED

PROS

- Will directly impact energy use of all new development within the City.
- Post construction energy efficiency policies will impact the City's existing building stock.

CONS

- Existing Seattle building standards will need to be reviewed in conjunction with Washington State and federal code requirements.
- Mandating performance based compliance requirements or introducing policies covering post construction energy use would place an additional burden on City staff.

CONSIDERATIONS IN POLICY DESIGN

- Stringency of building requirements and the associated level of financial burden to impose on the developer industry – would developers choose to build outside of Seattle?
- How should post construction and in occupancy energy performance be considered in policy design?
- Should a performance based compliance path be mandated for all buildings or should performance based compliance be incentivized by the City? The future requirements of the 2030 Challenge are unlikely to be able to be met with improvements in prescriptive requirements alone due to the inflexibility of this approach. Analysis using DMJM H&N's SSIM energy modeling software indicates that obtaining increased efficiencies in excess of 40% to 50% compared to current Seattle standards through prescriptive measures alone is both technically and economically difficult using current technologies.
- If a performance base approach is used, targets (be they energy or carbon) could be based upon percentage improvement targets in energy performance compared to an equivalent baseline building, based on modeled performance. Absolute targets could also be set (adjusted to reflect differences in size or building use) however this approach may discriminate against buildings with unusual and unavoidable loads, which may be unfairly advantaged or disadvantaged should absolute targets be set. This is avoided if the percentage improvement approach is used and receptacle or process loads are excluded from the calculation.
- How far can Seattle's policies be developed independently of state and federal code development?
- Suggestions for improvements to the Washington State Codes end on 31 March 2008 (for the next 3 year cycle). Therefore changes which may be affected by state policy should be submitted before this date.

CASE STUDY: CALIFORNIA TITLE 24 ENERGY CODE

1. THE POLICY

Title 24 was developed by the State of California in response to the energy crisis of the early 1970s. The standard was established in 1978 and has undergone numerous revisions since, the latest being in 2005. The California Energy Commission formally adopted the 2008 Standards in April 2008, which will come into effect as of July 1, 2009,.

The current (2005) and upcoming (2008) versions of the regulations are largely centered on energy use influenced at the design stage (for example in requiring mandatory performance standards in HVAC-R equipment and fabric to be achieved) and in construction (for example through residential duct leakage testing or non residential acceptance testing requirements). There are no provisions in the code related to the 'in operation' energy use of a building.

Title 24 is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change, from building standards contained in national codes.
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions.
- Building standards, authorized by the California legislature, that constitute extensive additions not covered by the model codes, that have been adopted to address particular California concern.

In addition, local Californian jurisdictions can modify the state energy code to be more stringent when appropriate documentation is provided to the California Energy Commission.

Compliance can be demonstrated by meeting the mandatory measures contained within the code, in addition to following either the prescriptive or performance based routes to compliance. While the performance based approach is currently only voluntary, state officials expect subsequent versions of the code to increasingly move toward requiring performance based analysis to be undertaken. Current expectations are that a performance based approach will become mandatory in the 2013 update.

Mandatory Requirements
The mandatory measures within the code require, among other standards, minimum insulation, HVAC-R, lighting and water heating efficiencies to be met. Regardless of which approach to compliance is subsequently followed, the minimum performance standards outlined in the mandatory requirements must be achieved.

Prescriptive Approach
As the simplest route to achieving compliance, the prescriptive approach requires each individual energy component within the building (for example building shell elements or HVAC equipment) to meet a prescribed minimum efficiency. The code covers all aspects of a building's design (and in some instances, construction) including, but not limited to the building envelope (insulation and fenestration), indoor and outdoor lighting, domestic hot water heating, and HVAC-R systems. In some instances, following the prescriptive route to compliance requires more stringent elemental methods than those outlined in the mandatory measures.

Performance Based Approach
Using the performance based approach, the annual Time Dependent Valuation (TDV) energy use of the proposed design must be shown to be less than or equal to the annual TDV energy use of the standard design. The standard design is defined as a building like the proposed design, but one that complies exactly with the mandatory measures and prescriptive requirements. Since 2005, TDV energy, rather than source energy has been required for this calculation. This approach values energy use differently depending on the time it is used (for example during periods of peak demand, when energy use is more costly than energy used during the periods of lowest demand).

Following the California electricity crisis of 2001, the Energy Commission has placed additional emphasis on demand reductions, hence the requirement to assess the TDV energy instead of source energy, which is the approach taken by most existing performance based building codes. The 2001 revision of the code helped to reduce peak electricity demand by approximately 150MW each year, with an additional 180MW (i.e. 330MW total) per year achieved through the 2005 revision.

Post Construction (In Operation) Performance

There are no explicit provisions in Title 24 related to the measured energy use of commercial or residential buildings. Upon the sale of a residential home, however, a buyer may request a home energy assessment which could include an inspection of insulation R-values in attics, roofs, walls, floors and heating and cooling ducts; an assessment of window types; an assessment of the age, fuel type and efficiency ratings of heating and cooling equipment, water heating efficiencies and the efficiencies of other major appliances; and an inspection of the general integrity and air leakage through walls, windows, doors and duct systems. Comprehensive energy inspections are not required under State law. Since October 2005, however, dwellings located away from the coast in climate zones specified by the Energy Commission must have their ducts pressure tested, sealed and verified by a HERS (Home Energy Rating System) rater whenever heating or cooling equipment is replaced. According to staff at the Energy Commission, this has helped to reduce average duct leakage in homes from over to 20% to around 6%, with associated improvements in energy efficiency.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

Compliance with Title 24 is mandatory for all new construction projects in the state of California. The code applies to all residential and non-residential new construction projects and refurbishment projects requiring a permit. Consequently, changes to Title 24 have far reaching effects on energy use in the state.

2.2. Energy Savings Potential

As there is no requirement in the code pertaining to the actual measured energy performance of buildings, detailed historical energy savings data is not readily accessible. Despite this, some energy bill and modeling analysis has been undertaken which indicates that 2005 code compliant non-residential buildings are approximately 11% more energy efficient than buildings constructed under the 2001 standard. For residential buildings, increased efficiencies of approximately 13% are seen. For the 2008 revision of the code, energy savings of approximately 8% for non-residential buildings and 13% to 15% for residential buildings are expected to be achieved, compared to the 2005 version of the code. Since its inception, Title 24 is estimated to have saved more than $56 billion in electricity and gas costs within the state. It is estimated an additional $23 billion of energy will be saved through 2013. The Energy Commission's route map points toward achieving carbon neutrality through the code by 2020, though no plan detailing the incremental requirements to meet this target has been published.

Staff at Consol Energy Consultants noted that the true energy savings potential of the code is often compromised in the field by poor construction and enforcement practices in the state. Anecdotal evidence suggests that building efficiencies are typically up to 10% lower than anticipated at the design stage due to poor quality construction and installation practices and a lack of strong enforcement practices. It was noted that, while State inspection staff are trained and available, there is insufficient travel budget to enable them to carry out inspections across the State.

3. COST OF IMPLEMENTATION

3.1. Program Cost

A team of 20 people administers updates to the code in three to four year cycles. State officials expect this number to increase to approximately 40 people within the next few years as the State energy code regulations move toward a performance based program, with comprehensive greenhouse gas mandates aimed at achieving carbon neutrality in new buildings by 2020. Not all of these staff are involved directly in the implementation and development of Title 24 on a full time basis, as staff are distributed across all areas of building regulation development. Updates to smaller, less controversial aspects of the code are carried out within the commission; however, more substantial revisions are contracted out to external analysts. As updates to Title 24 are carried out as part of the State's cyclic code update program, detailed cost data for each revision is not readily available, though as the standard becomes more stringent, officials expect development and administration costs to substantially increase.

3.2. Cost to the Developer

Prior to implementation of the code, the city must carry out detailed life cycle costs analysis to demonstrate that

any policies they are putting forward are cost effective. Rob Hammon of Consol Energy Consultants estimates that for an increase in code stringency of between 15% and 20%, construction costs are increased by approximately $2000 to $2500 per home (typically 1% to 2% of construction costs). Costs increases for commercial buildings are more difficult to ascertain due to the wide range in size and type of non-residential buildings. Anecdotal evidence similarly suggests that a 1% and 2% increase in construction costs would result from increasing the code stringency between 15% and 20%. Detailed data regarding increases in construction costs is not collected by Energy Commission.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The code is administered by the California Energy Commission. Compliance with the code is overseen by local building officials and inspectors.

4.2. Ease of Initiation

As Title 24 is updated cyclically in 3-4 year intervals, updated versions of the code have traditionally been relatively easy to implement. According to state officials, however, the implementation process of recent versions of the code has become increasingly more difficult due to the escalating technical requirements in each subsequent revision of the code. It was also noted that the more technically challenging the standard, the more difficult it was to get the building industry in the State to understand and adopt to its requirements. Education and outreach is likely to become increasingly important and wide ranging with future revisions, particularly if a performance based compliance route is mandated in 2013.

4.3. Educational Outreach Requirements

According to Commission officials, countless different types of education and outreach programs have been conducted on the code. Currently, Title 24 compliance training is conducted through the State's utility companies and is unrelated to the Energy Commission. The State has approximately $1MM per year for education and outreach activities; however this is not consistent year upon year. Education and outreach requirements are higher at the time before and around a new revision of the code and decrease throughout the lifespan of the code revision.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Building Industry

The State involved stakeholders throughout the development process; maintaining a strong dialogue with California building industry associations through personal relationships and ad-hoc consultation with industry representatives. This approach was taken in order to allow the State to consult with the building industry to develop "reasonable measures" which are achievable by builders and developers alike. It was also noted by State officials that there are often contradictory requirements between local building departments and the building community regarding new code standards. While it is often advantageous to give the industry flexibility in meeting code requirements (as this allows new legislation to be more easily introduced), this approach often causes difficulties for building inspectors in enforcing code standards. As such, it was noted by State officials that it was vital to consider the enforceability of any new standards being proposed, in order to not burden building officials with unenforceable standards.

During the 2008 code development process, it was reported that there was significant opposition to some of the more far reaching requirements. Eventually, the State removed some of these to get industry approval. For instance, requirements for "programmable communicating thermostats" (PCTs) faced such backlash from the media, consumer groups and the general public that the requirements were dropped altogether. Requirements pertaining to the urban heat island effect and in particular the provision of "cool roofs" were also dropped due to concern from the product industry about the feasibility of supplying such roofing systems to all new building's in the State, in addition to opposition from builders and developers relating to the costs of installing cool roof systems on all buildings. Requirements related to the provision of radiant barriers were also removed during the industry consultation process, primarily due to concerns from builders relating to the cost of installing radiant barriers on all new construction projects.

Other areas of contention have been ongoing with industry for a number of years. Requirements relating to the

provision of exterior shading screens were intended to be included several years ago, but opposition from the architectural and developers communities led to the requirements being removed, largely due to the threat from the industry that, if screens were mandated in the code, they would be installed for the purposes of being code compliant but immediately removed following building department approval. New legislation requiring shading screens to be permanently installed was also rebuked by the industry, due to concerns from the design community that screens would not necessarily fill in with the aesthetic or technical requirements of projects. Although legislation was never introduced, Energy Commission Officials reported that shading screens are now becoming voluntarily more commonplace on new buildings in the State.

According to Rob Hammon at Consol, in recent years there has been a move from an adversarial relationship between builders and developers to a more collaborative relationship, as the industry and the Energy Commission work together to ensure the code is satisfactory to all parties. The industry is generally concerned that the code be as cost effective and practical to implement as possible. Their concerns also extend to impacts in the market; industry is worried that stringent and costly code revisions will increase the cost of leasing or buying new buildings compared to existing buildings. It was also noted that there was some concern from the building sector that increasing the stringency of the code (with associated increases in costs for builders complying with the code) would, without proper enforcement, lead to a "black market" of "cowboy" builders undercutting more reputable builders by not fully complying with the code requirements.

6. REFERENCES

Rob Hudler, California Energy Commission

Rob Hammon, Consol Energy Consultants

CASE STUDY: ENGLAND AND WALES (PART L 2006) ENERGY CODE

1. THE POLICY

Part L (2006) of the England and Wales Building Regulations (Conservation of Fuel and Power) came into effect in April 2006, superseding the 2002 version. Part L (2006) is based on the requirements of the EU "Energy Performance in Buildings Directive" (EPBD) which required member states to introduce a standardized method for assessing the energy efficiency of new buildings, based on modeled energy performance. The regulation includes provisions for energy use in design (through prescriptive requirements and performance based modeling) and in construction (through the use of pressure testing, as a measure of a building's standard of construction). There are, however, no specific requirements pertaining to energy use in operation.

Non-residential Buildings

The 2006 revision marked a departure from previous versions, by mandating that a performance based methodology be used to demonstrate compliance. Mandatory provisions are still retained in the code, to ensure that the building's shell and systems are sufficiently energy efficient. Compliance with the energy component of Part L must be demonstrated by meeting five key criteria, as follows:

1. The calculated CO_2 building emissions rate (BER), as designed, must not be greater than the target emission rate (TER). The target varies between a 23.5% and 28% reduction in annual CO_2 emissions, depending on the servicing strategy of the building. For non-residential buildings the calculations are performed by the SBEM (Simplified Building Energy Model), using free Government designed software. Approved 3rd party simulation packages may be used to assess energy performance in more complex buildings which cannot be effectively modeled using the free SBEM software. Standard thermal templates for the appropriate building and room type must be used in the calculation to normalize the standard for all buildings, and so not to advantage or disadvantage buildings with atypical energy load patterns. Only energy components which can be influenced directly by the design team are included in the CO_2 emissions calculation; process and receptacle loads are excluded.
2. Building shell and systems performance specifications must be within prescribed limits set out within the code, with differing requirements for residential and non-residential buildings.
3. Areas of a building not served by cooling systems must include appropriate passive control measures to limit solar gain.
4. The performance of a building as constructed (based on energy modeling) must be consistent with the predictions made in the 'as designed' BER calculation, prior to the building receiving building control approval. To demonstrate compliance, a BER calculation must be carried out post construction and must include the results of air pressure tests carried out on the completed building, along with any changes to the building made during the construction. *Note, this requirement does not constitute an assessment of a building's energy performance 'in operation'*.
5. Satisfactory information must be provided in operations and maintenance instructions and a building logbook to enable building occupants to achieve energy efficient performance.

For non-residential buildings, large extensions (of greater than 100m² and 25% of the total floor area of the existing building) are treated as new buildings and must meet the requirements for new construction outlined above. All other extensions must meet the prescriptive performance requirements in the code.

For buildings over 1,000m², renovation may require improvements to be made to existing services in areas of the building not otherwise affected by construction, such as upgrading the building shell or installing more efficient HVAC equipment. Increases in the capacity of heating or cooling systems automatically requires that improvements be made to the thermal elements (such as the installation of new windows or insulation), provided the improvements are technically, functionally and economically feasible. There is no cost limit on such improvements, but they should be shown to have a payback period of less than 15 years.

Residential Buildings

New residential buildings must meet the same five criteria for energy efficiency as non-residential buildings. For Criterion 1, calculations must be made to demonstrate that the annual CO_2 emissions of the dwelling (DER) exceed the target emissions rate (TER) using the SAP (Standard Assessment Procedure) 2005 methodology for determining CO_2 emissions. Free government approved SAP software must be used to perform the calculation.

For extensions, conversions or alterations, a prescriptive approach to demonstrate compliance is allowed, whereby limiting values for shell performance and equipment efficiencies outlined in the code must be met.

Post Construction (In Operation) Performance
Part L (2006) does not include any specific provisions for post occupancy assessment related to a building's ongoing energy performance (the requirements of Criterion 4 as outlined above relate only to the modeled energy performance of the constructed building). As part of the Government's requirements under the EPBD, however, mandatory Energy Performance Certificates (EPCs) for all buildings and Display Energy Certificates (DECs) for large public buildings were introduced in 2008.

An EPC must be produced at the completion of each new building or at the point of sale or lease of an existing building. The EPC will be based on the building's Asset Rating, which is the inherent energy performance of the building (i.e. the energy associated with fixed building services, such as heating, cooling, lighting and ventilation but not including process or receptacle loads) as determined by performance based computational modeling for non-residential buildings, or through a prescriptive home inspection survey for residential dwellings. As such the EPC does not reflect the operation or maintenance of the building and its energy systems. The EPC must be produced by an accredited assessor using a standard methodology and software, and is valid for a maximum of 10 years. A Recommendations Report must accompany the EPC, giving the owner and occupiers guidance as to how they might improve the energy performance of the building. There is, however, no mandatory requirement to implement any of the recommendations.

Display Energy Certificates (DECs) apply to large public buildings, defined as buildings with a total useful floor area over 1,000m² and occupied by public authorities or by institutions providing public services to a large number of persons. The DEC must be on prominent public display and is valid for one year. It must include advice on improving the building's energy efficiency, but there is no mandatory requirement to implement the recommendations. The DEC is based on the building's Operational Rating, which is determined from the actual metered energy consumed by the building and includes small power, lighting, heating, cooling, ventilation and all other energy consuming services. The DEC must be produced by an accredited assessor, based on a standard methodology. Although only mandatory for public buildings, commercial organizations may elect to display certificates.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

Part L (2006) of the England and Wales Building Regulations covers all new construction and extensions, conversions or alterations to buildings in the countries of England and Wales.

2.2. Carbon Savings Potential

A detailed regulatory impact assessment was carried out to assess the cost and benefits of the introduction of the standard. As the regulations mandate reductions in carbon emissions as opposed to energy use, benefits are presented in terms of carbon. By 2010, it is estimated that Part L (2006) will yields carbon savings as follows:

Area of saving	Annual carbon saving
Residential new construction	87,000 metric tons (~320,000 kg CO_2)
Non-residential new construction	143,000 metric tons (~524,000 kg CO_2)
Residential extensions	10,000 metric tons (~37,000 kg CO_2)
Non residential extensions and renovations	256,500 metric tons(~950,000 kg CO_2)

3. COST OF IMPLEMENTATION

3.1. Program Cost

The code was written in conjunction with two technical consultants; Faber Maunsell was responsible for the research and development, and the Building Research Establishment (BRE) developed the Government's free SBEM software and compliance methodology. Research and development costs were approximately £1.25MM (~$2.25MM). As the SAP methodology (and Government compliance software) was already required under the 2002 regulations, no additional costs were associated with its use in the 2006 regulations. SBEM was estimated to have cost around £500,000 (~$900,000) to develop, with ongoing maintenance and development costs of up to

£50,000 (~$90,000) per year. Approximately £500,000 (~$900,000) was also budgeted for providing industry education and training.

3.2. Cost to the Developer

Construction Costs
Government forecasts in 2006 predicted marginal increases in new building costs as a result of the new regulations. Housing costs were expected to rise from approximately £600 (~$1,000 or ~0.4% of new housing costs) for mid terrace houses, to £1,200 (~$2,200 or ~0.5% of new housing costs) for detached houses and bungalows. This is corroborated in practice by Peter Redgwell of Countryside Properties PLC, who estimates that the 2006 regulations have increased development costs by around £1,000 (~$1,800 or ~0.4% to ~0.5% of new housing costs) per unit.

For non dwellings, additional construction costs attributed to Part L (2006) were estimated at £28.91/m² (~$4.80/sf) for commercial and public buildings and £10.32/m² (~$1.72/sf) for industrial buildings, representing an increase in total construction costs of 1.9% and 1.6% respectively. The increase in costs for renovation projects was estimated at £11.84/m² (~$1.98/sf) for commercial and public buildings and £8.11/m² (~$1.35/sf) for industrial buildings.

Training Costs
It was also noted that all sectors of the industry would have to bear training costs associated with becoming familiar with the technical requirements and methods of compliance associated with Part L (2006). A Government estimate of the additional first year training costs to the industry was approximately £9.5MM (~$17.1MM, or ~about 0.017% of the annual construction industry value). This was expected to significantly reduce beyond after the first year, once the industry was up to speed with the requirements of the regulations, though specific ongoing industry costs are unknown.

Ongoing Industry Compliance Costs
For new dwellings, no additional costs were predicted as energy performance calculations were already required for dwellings in the 2002 version of the regulations.

For non dwellings, additional costs to developers were created through the new, performance based compliance procedures, though these costs vary depending on the size and complexity of buildings. This view was confirmed by Neil Pennell of Land Securities, who believed that these costs were generally accepted by the developer community and were absorbed without impeding development progress. It was additionally noted by Pennell that the benefits of the performance based approach to design outweigh the additional financial burden that the methodology brings. Government estimates suggested that the additional compliance costs to the industry associated with following a performance base compliance path would be around £11MM (~$19.8MM or ~0.07% of total annual commercial construction costs) per year.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The code was written by CLG in conjunction with two technical consultants, Faber Maunsell and the Building Research Establishment (BRE). Enforcement and compliance assessment of the code is overseen by local jurisdiction building control officers.

4.2. Ease of Initiation

Staff at Faber Maunsell described the implementation process as being “very difficult”; chiefly due to the requirement to follow a performance based route to compliance using carbon emissions as the basis for calculations. Staff at Land Securities believe they and their peer group were generally well prepared for the implementation of the regulations, because of the long lead time prior to implementing the code. According to staff at Countryside Properties, the residential market was less well prepared for the changes to the regulations, particularly the smaller developers who described the process of adapting to the new regulations as a “significant undertaking” due to the requirements for a more scientific process to be followed to achieve compliance.

4.3. Educational Outreach Requirements

A large scale implementation and dissemination program was conducted from July 2005, nine months before the regulations came into effect.

Malcom Hanna of Faber Maunsell, who headed the development of CLG’s training package, noted that key

industry professionals who would be impacted by the regulatory changes were identified and targeted for priority training. Building control officers were one such target, as they would be significantly impacted by changes to the way that compliance is demonstrated (for example having to assess and approve performance calculations).

A significant amount of training was held over the 18 month period surrounding the implementation of the code. At the start of the process, a "Train the Trainers" program was held, with eight CLG workshops conducted for key industry representatives who would be involved in the dissemination of training across the industry. Attendees were provided with CLG approved training material to use in training sessions, thus ensuring that accurate and consistent training sessions were held across the construction sector.

Additional industry wide training included the following:

- Seminars for Building Control Body (BCB) managers and staff.
- Speaking engagements at public events held by professional institutions.
- An e-learning CD on new performance standards and compliance procedures was issued free of charge to all BCB operational staff to enable them to become familiar with the new performance standards and compliance procedures. .
- An email helpdesk system was also set up to provide assistance to those using the new calculation methods.
- Training seminars were held by various construction industry organizations on the impact of the new regulations on their members.

Total industry training costs for the first year proceeding policy implementation was estimated to be approximately £10MM (~$18MM or ~0.017% of the annual construction industry value), of which approximately £500,000 (~$900,000) was incurred directly by CLG with the remaining absorbed across the industry through corporate training and development budgets.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Building Industry

The Government's Energy White Paper entitled "Our energy future – creating a low carbon economy", published in 2003, was the first notice that stakeholders received of the upcoming major revision to Part L. Numerous formal and informal industry consultations, comprising of 6 separate working groups, each of 20-40 people, were held over the two year development period to minimize any negative impact of the new regulations. Research was also undertaken by CLG's technical consultants, Faber Maunsell, to determine performance targets which were in line with the Government's carbon targets under the Kyoto Protocol, while also being realistically achievable (in terms of both technical requirements and cost) by the industry.

It was recognized that all sectors of the construction industry would be affected by the regulatory changes, from building owners, tenants and facilities managers, to designers, product manufactures, building control bodies and construction firms. Anecdotal evidence indicates that there was some initial concern about the loss of the prescriptive approach, particularly among architects who believed that this gave certainty in the design process. MEP Engineers, however, believed that having a single route to compliance would remove ambiguity. It was noted by staff at Faber Maunsell that now, two years since the introduction of the regulations, the industry would likely resist any moves to introduce simpler prescriptive routes to compliance, because of the benefits to building design (and to the construction industry as a whole) that the performance based approach creates. It was also recognized that some product industries, such as the window and glazing industry, would need time to revise their product designs to accommodate the new performance standards, and that builders would need some time to improve sealing during construction and fit-out. Provisions within the regulations therefore allowed for some relaxation of standards in the first 18 months after implementation.

According to Steve Irving of Faber Maunsell, the requirement to move to a performance based approach was a "culture shock" to the industry, although there was recognition it was the correct path to achieve the Government's carbon reduction targets. Staff at developer Land Securities believe that the regulations provided a wake up call to the industry to review its practices for designing and constructing buildings. Consensus between developers and those involved in the development of Part L (2006) suggests that it has catalyzed an industry wide shift in design and construction practices and processes that will ease the burden on future revisions. These periodic revisions to the code are expected to require improvements in building performance of 25% at four-year intervals.

6. REFERENCES

Steve Irving, David Ross and Malcolm Hanna, Faber Maunsell (Technical Consultants to CLG)

Peter Redgwell, Countryside Properties (residential)

Neil Pennell, Land Securities (commercial)

7. NOTES

Where British Pounds has been converted into US Dollars, an exchange rate of $1.8 / £1 has been assumed.

DESKTOP STUDY: ALBUQUERQUE ENERGY CONSERVATION CODE

1. THE POLICY

Albuquerque's Energy Conservation code was developed from the City's Green Ribbon Task Force which was set up by the Mayor as part of the "Albuquerque Green" campaign established in 2007. The code was originally intended to be implemented in April 2008 however this was extended to October 2008 in order to allow City leaders and industry advocates to resolve their differences surrounding the most contentious areas of the code, through potential code amendments, including lowering the lowering of certain standards and delaying the implementation of others.

Ultimately, consensus on code changes was not reached and in July 2008, fourteen stakeholder groups, led by the Air Conditioning, Heating and Refrigeration Institute filed suit against the city, seeking a preliminary injunction against the code's implementation. This was granted on October 3rd, blocking the enforcement of the two volumes of the code which had previously been adopted by the City Council. The City is currently challenging this preliminary ruling, prior to the full hearing taking place. While this is ongoing, the City is investigating routes to implement areas of the code not subject to the litigation, though no definite date has been sent for the release of the uncontested areas of the code.

Code Requirements

The full code sets out requirements for commercial buildings, multi-family residential buildings and single-family dwellings. Additions, alterations, renovations, or repairs to an existing building or to building system, are required to conform to the provisions of this code as they relate to new construction but do not require the unaltered areas to comply.

The code is largely focused on influencing energy use at the design stage of new construction projects, by requiring buildings to meet mandatory and / or performance based compliance standards. Requirements relating to the influence of the construction phase of a project are also considered, with the requirement for thermal bypass inspections to be carried out on all buildings. These are designed to inspect insulation installation and ensure "tighter" buildings with less air leakage. There are no provisions in the code relating to energy use in occupation.

General code requirements are outlined separately for the following building types, as follows:

Commercial and multi-family residential buildings
Commercial buildings greater than 20,000 sq ft and multi-family residential buildings must be 30% more energy efficient than a baseline building, which is defined as a building of the same size and use as the proposed building that meets the minimum efficiency requirements of ASHRAE 90.1-1999. This target was established to align the building code with the City's current Architecture 2030 targets. Prior to issuing a permit, the building department will require that the increased performance of the proposed building be quantified using the Performance Rating Method described in Informative Appendix 'G' of the 2004 edition of ASHRAE 90.1. The following information will have to be submitted with each permit application:

- Energy calculations for the baseline building design.
- Energy calculations for the proposed building design.
- Calculations verifying the percentage improvement of the proposed design over the baseline design.
- A list of energy-related features incorporated into the proposed design to increase efficiency.
- A thermal bypass inspection must also be carried out.

In addition, the building shell and HVAC equipment must meet mandatory requirements set out in the code, including the requirements that the building elements meet minimum insulation values and all HVAC equipment must be ENERGY STAR labeled. In addition, thermal bypass inspections must be carried out.

As an alternative to the performance based approach, projects may follow the Simplified Approach Option for Building Envelope; provided the gross floor area of the building is 20,000 square feet or less; the building uses unitary heating and air-conditioning equipment; and the building is an office building or retail building. This option does not require energy performance calculations to be performed, but sets out prescriptive requirements (over and above the mandatory standards) that a building must meet to demonstrate compliance.

Buildings that use no or very low amounts of fossil fuels, are exempt from the requirements of the code, as are buildings certified as LEED silver or above.

One and Two Family Detached Dwellings and Town Houses
Single and dual family detached and town house dwelling requirements are based on an adopted and amended version of the 2006 International Energy Conservation Code (IECC) and must meet the mandatory requirements of the IECC code, along with the City's amendments outlined in the Energy Conservation Code. In addition to meeting the mandatory provisions of this code dwellings must either meet additional prescriptive requirements or follow the performance based compliance path outlined in IECC Sections 404 and 405. These require that the proposed residence be 30% more energy efficient than the baseline residence, defined as a computer representation of the proposed residence that meets the minimum requirements of the 2003 IECC.

Mandatory provisions of the code which all residential buildings must meet include the following:

- Furnaces are required to be 90% efficient (AFUE) and must be ENERGY STAR labeled.
- Boilers, heat pumps and fans must be ENERGY STAR labeled.
- Air conditioners must have a seasonal energy efficiency ration (SEER) of 15 and be ENERGY STAR labeled.
- 70% of interior lighting must be ENERGY STAR labeled.
- A thermal bypass inspection must also be carried out.

As with commercial buildings and multi family residences, buildings that use no or very low amounts of fossil fuels, buildings certified as LEED Homes Silver or above, and buildings certified as Build Green New Mexico Silver or above, are exempt.

Post Construction (In Operation) Performance
There are no provisions in the proposed code related to the in operation energy use of commercial or residential buildings, though, as previously noted, thermal bypass inspections must be carried out in order to encourage the construction of more air tight, thermally efficient buildings with lower energy use during building operation.

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

Compliance with the proposed Albuquerque Energy Code will be mandatory for all new construction projects in the City of Albuquerque.

2.2. Energy Savings Potential

By requiring that large commercial buildings (greater than 20,000 sq ft) follow a performance based compliance path, the City is able to set specific energy performance targets for buildings compared to a "baseline" version of the same building, which would not be possible with prescriptive requirements alone. For large commercial buildings to comply with the Albuquerque Energy Code, they must be designed to be 30% more energy efficient than an equivalent building designed to ASHRAE 90.1-1999 minimum standards. Residential buildings following the performance based compliance path must be designed to be at least 30% better than 2003 IECC standards. Small commercial buildings or residential buildings following prescriptive compliance paths are designed to achieve energy savings comparable to those required using the performance based approach.

3. COST OF IMPLEMENTATION

3.1. Program Cost to the City

Exact costs to develop the policy for the City are difficult to ascertain, particular due to the ongoing legal action currently surrounding the implementation of the code. The code was developed by the City's Green Ribbon Task Force, made up of 23 stakeholder representatives including local builders, developers, architects, unions and other prominent companies within the City, in conjunction with the City's Departments of Planning and Code Enforcement. Task Force representatives worked on a voluntary basis, with the majority of the code development itself carried out by the City's Department of Planning Green Building Coordinator.

3.2. Cost to the Developer

Detailed costs to developers are not available from the City. Anecdotal evidence indicates that the City expects builders and developers to see increases in costs, but expect that improvements in energy efficiency alone will offset the impact of any costs increases.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

The code was developed by the City of Albuquerque Department of Planning, in conjunction with the Department for Code Enforcement and Green Ribbon Task Force. Once implemented, the code will be administered by the Department of Planning.

4.2. Ease of Initiation

Although originally intended to be implemented in April 2008, the implementation date was extended to October 2008 to allow additional industry consultation to take place. Due to the legal action taken against the City and subsequent preliminary injunction preventing the City from implementing the code, the code has yet to be released. City officials are currently consulting with stakeholder groups in order to try to implement areas of the code not covered by the legal action. However, the release date for both the preliminary and final release of the code is currently unknown.

4.3. Educational Outreach Requirements

The City's educational outreach program began six months prior to the originally intended date for the release of the code, in order to give the industry sufficient time to become accustomed to the requirements of the code prior to its release. Throughout this period, a number of training seminars were held by the City for local industry in order to train and disseminate information on the code to local stakeholder groups. It is expected that educational outreach activities will be key to the ultimate success of the code once the current legal issues have been resolved however currently the outreach program is on hold pending resolution of the ongoing legal case.

In addition to specific education activities relating to the energy code, the City maintains a number of green building initiatives to encourage and foster an interest in green building within the City. For example, they established a Green Path program to encourage and facilitate the voluntary design and construction of exemplary energy efficient buildings that substantially exceed minimum code requirements. Green Path Energy Conservation Certificates, issued with the building permit, are official recognition by the Green Path Administrator of the extraordinary level of achievement these projects represent. Albuquerque Green certificates are issued at completion of high-performance green building projects.

The City also promotes the Build Green New Mexico program, a voluntary organization set up to encourage homebuilders to use technologies, products and practices that will:

- Provide greater energy efficiency and reduce pollution
- Provide healthier indoor air
- Reduce water usage
- Preserve natural resources
- Improve durability and reduce maintenance

Outreach is primarily conducted through the organization's website and through training courses given to local residential builders and building designers on green building design.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Building Industry

Although local industry representatives were involved throughout the stakeholder process, contentious standards within the code ultimately led to legal action being taken against the City, the details of which are outlined below:

Current Litigation Proceedings
Prior to legal proceedings taking place, an eleven member Task Force made up of contractors and distributors with Heating, Air-Conditioning and Refrigeration Distributors International (HARDI) and Air Conditioning Contractors of America (ACCA) membership was formed in order to communicate directly with the City regarding the contentious issues within the code that it believes violate federal law. In particular, areas relating to the enforcement of appliance standards greater than federal standards, such as those surrounding HVAC-R equipment and water heaters, have come into question. For example, the code requires 14 SEER air-conditioning equipment and an Annual Fuel Utilization Efficiency of 90% for furnaces in all new construction and retrofit mechanical systems (delayed until 2010 for retrofit systems) while the current federal standard for residential air-conditioning is 13 SEER and 78% AFUE for gas furnaces. The Task Force argues that the stricter

City codes are preempted by federal law, and the City cannot enforce them without first obtaining a waiver from the US Department of the Environment. There was additionally some opposition to the most stringent areas of the code as it was feared that, without proper enforcement, a black market of less energy efficient equipment would be created in the City.

City policy makers believe that the code is not in violation of federal law due to the performance based approach which must be followed. Despite this, The City believed that the nature of the code allows contractors to reach those efficiency goals by any number of means, for example through improvements in insulation and energy efficient windows as additives to the exact equipment requirements, in order to calculate the desired goals.

6. REFERENCES

Due to the ongoing legal action surrounding the code, representatives from the City were unavailable to participate in consultation; therefore the information contained in this case study is based on desk research only.

FUTURE SEATTLE DISTRICT HEATING POLICY

1. INTRODUCTION

Review of the existing district heating market in the City has suggested that any future district heating policy in the City would need to be aimed at both encouraging the development of future district heating network infrastructure and capacity as well as encouraging (or requiring) consumers to connect to networks for their domestic hot water or space heating requirements. An overview of some of the challenges to be overcome is outlined below; however this should not be considered as a comprehensive study of all options available to the City. The policy options presented here are largely based on discussion with Seattle's existing sole district heating supplier, Seattle Steam, along with the case studies conducted on existing district heating policy in London and Vancouver.

2. CURRENT CHALLENGES

There are a number of challenges faced by district heating suppliers in Seattle currently limiting the expansion of district heating infrastructure into the City. In particular,

Carbon content of electricity
Data from Seattle City Light shows that over 86% of the City's electricity is produced from hydro power, with more than half of the remaining load provided by wind, nuclear and biomass sources; therefore currently electric resistance heating is the lowest carbon option for the Seattle. The heat produced by Seattle Steam is currently produced from 100% fossil fuels, although this is expected to reduce to 40% from July 2009, following conversion of one of the company's two steam plants to burn waste wood products, with a long term goal of reaching 100% renewable production by 2020.

The future of Seattle's hydro electricity is vulnerable to inevitable shrinking of the snow melt supplying the turbines due to climate change and the prospect that the snow pack may eventually disappear. In this instance, allowing continuing installation of electric heating is setting Seattle's resident and business populations up for widescale and costly retrofitting.

If future growth within the City outstrips energy efficiency improvements, Seattle City Light will need to purchase an increasing % of fossil fuel generated peak power.

In order for district heating to become an attractive and sustainable proposition, future district heating policy must be based on both recognizing the potential for that the current and future district heating networks to be powered through waste heat or renewable resources such as biomass, and the need to future proof the powering of the City's buildings.

Encouraging and expanding the use of district heating would also help to reduce the need for additional fossil fuelled electricity to be purchased by the utility companies to service the City's electrical requirements, thus reducing the overall carbon content of the City's fuel mix.

High cost of district heating compared to electric resistance heating
Electric resistance heating is around two thirds of the price of purchasing heat from Seattle Steam. The cost differential can be contributed to:

- High cost of gas and oil to produce steam compared with hydro generated electricity.
- Seattle Steam is currently 'double taxed' compared to other service organizations, due to gas use tax (GUT). Although long term the company intends to move to 100% renewable steam generation, in the short to medium term it is estimated that the additional tax liabilities compared to other utility companies costs Seattle Steam in the region of $1.5MM per year.
- The costs of installing district steam or hot water infrastructure is high and infrastructure development costs currently must be met and recouped by the company through existing rate structures. Ultimately this means the costs of supplying district heat to customers is higher than an electric solution.

3. POLICY OPTIONS

Future district energy policy in Seattle should largely be focused on facilitating infrastructure development in order to increase market penetration in the City. Jurisdictions with existing comprehensive district heating

infrastructures (such as Copenhagen) focused policy in creating funding streams to develop new infrastructure for example through carbon tax and facilitated cheap loans from the national Treasury and banks. The city also put into place special zoning for district heating and put in place an obligation to connect to the system (time depending on building usage).

3.1. Infrastructure Development

The City should consider a number of ways to finance development in district thermal network infrastructure:

- **Remove gas use tax liabilities on district heating suppliers:** Staff at Seattle Steam estimated that the additional taxes the company pays compared to other utility companies (largely due to State and City gas use tax) costs the company in the region of $1.5MM per year. Bringing tax requirements in line with other utility providers would provide the company with an additional source of funds, which, it was noted could be used as annuity on a loan of up to around $15MM. This could be invested in improving the City's existing network (for example to assist in constructing CHP plant) or creating new infrastructure.
- **Encourage the selling of waste heat to power community district heating networks:** The City should consider ways to encourage waste heat producing industries to sell heat to community district heating schemes. Much of the development of Copenhagen's district heating infrastructure was funded through a carbon tax which gave value to the waste heat produced by industrial processes (as selling waste heat provided a carbon offset). Proceeds from the carbon tax are used to fund the development of the infrastructure in the City; to the point where the district heating network serves nearly 95% of households in central Copenhagen. Due to the success of the carbon tax scheme in encouraging industry to sell waste heat, the oversupply of waste heat during the summer months lead to the introduction of a district cooling network in the City, with cooling supplied by absorption chillers connected to the City's district heating network.
- **Develop a "Savings by Design" rebate scheme:** In California, financial incentives are available from utility companies to building owners and designers in building energy efficient buildings which reduce demand on the existing transmission networks. This concept could be used in Seattle, with rebate funds from utility providers being apportioned between customers and a district energy fund, which could be used to finance the development of district CHP plant to supply electricity to the electrical utilities and heat to district heating utilities.

3.2. Market Penetration

Additional policy should be considered by the City to encourage the use of district heating networks by consumers in areas where connection is available:

- Develop 'energy masterplans' mapping heat loads and networks in the different areas of the city to show the areas where decentralized energy projects are viable. Each 'energy masterplan' would identify zones for decentralized energy systems based on the densities of heat demand, location of existing and potential future heat networks, location of existing building 'anchor tenant' heat loads, location of sources of waste heat or excess capacity and land to locate energy centers. 'Anchor tenant' heat loads would include civic centers, hospitals, libraries and leisure centers. The city should commit to connect its estate (if not already) to current or future heating networks.
- **Require mandatory participation in district heating systems:** The City could require all new developments and buildings undergoing major renovation to connect to district heating systems within the 'energy masterplan zones' and/or where existing networks are available. If not available, the developer would pay into a green investment fund (a community infrastructure levy) to help establish future heating networks. Although this would virtually guarantee 100% participation, developers may not be able to recover the additional costs of district installing hydronic heating systems from the market which could place an undue financial burden on complying, particularly for small commercial developers, residential developers and low income housing developers. The City would help developers to access low cost borrowing for connecting to existing networks and to DH operators to establish new networks.
- **Restrict the use of electric resistance heating:** The City should consider restricting the use of electric resistance heating in new developments in the City within energy masterplan zones. This may apply to all developments, or, more realistically only those exceeding a certain threshold size or use. This would encourage developers to make use of district heating, where available, as well as to encourage the installation of hydronic heating systems where not currently available, which would facilitate later connection to district heating systems when future infrastructure allows. Threshold targets could be set so as not to impact those most vulnerable to increases in development costs, for example low income housing providers.

- **Offer connection grants to offset the costs of hydronic heating systems:** Grants could be offered to developers to offset the cost of installing hydronic heating systems. This would facilitate connection to district heating networks, whilst reducing the financial burden on developers in installing hydronic heating. Policies previously assessed by the new construction green building task force may be considered worthy of further investigation for alignment with district heating policy.
- **Standardize contractual agreements:** Underpinning any of these relationships will be a contract between developer, energy suppliers and neighboring development. The City could help facilitate the development of a contractual toolkit supported by service level agreements which include language relating to service failure which can take time to draft (and are technically demanding).

4. KEY DECISION POINTS

If the City is convinced of the long term benefits – both economic and environmental – of investing of district heating networks it should consider

- Providing anchor heat loads
- Getting involved with the ongoing governance structure to provide protection to consumers
- Providing leases for energy centre sites
- Providing grant funding for initial stages of projects
- Setting up and managing a Green Investment Fund
- Subsidizing heat from the district heating network so it is cost equivalent with electric heating in the short term
- Providing low cost borrowing to fund extension of steam network
- Bringing tax liabilities of district heating providers in line with those of other utility companies

This will send clear signals to the developer market that this is the route that Seattle wishes to pursue to deliver long term low carbon, low cost energy to its population.

5. REFERENCES

Cutting the Capital's Carbon Footprint – Delivering Decentralised Energy – London First and Buro Happold.

Michael King, Associate, Combined Heat and Power Association, UK; conversation 1 November 2008

Stan Gent, CEO and President, Seattle Steam

CASE STUDY: VANCOUVER'S DISTRICT HEATING PROGRAM

1. THE CONCEPT OF DISTRICT HEATING

A district heating system (sometimes called a community energy system) is an integrated, large-scale and flexible way to distribute heat to a number of buildings. It consists of a network of underground pipes linking suppliers with consumers, enabling energy consumption (steam, hot or chilled water) to be managed at the community level. The network approach leads to greater overall efficiency, lower and more stable energy costs. The variety of processes and the use of local resources help mitigate the impact of a volatile fossil fuel marketplace (though some district energy networks and CHP systems do run on fossil fuels).

Cities characterized by high-density development, such as technology parks, malls and multi-unit residential clusters, are the best candidates for connection to a district heating system. Cities characterized by low-density developments (such as distributed single-family housing) are less suitable for district heating, due to the larger distances over which heat must be distributed.

New developments, where the purchase of heating equipment for individual buildings can be avoided, are ideal candidates for district heating. Existing buildings can also be good candidates for district heating, particularly if the fuel source is free or low-cost. Even using natural gas initially as the primary fuel may be cost-effective, when operations and maintenance are taken into account. This may be viewed as a temporary stage en route to a future, renewably-based district heating system.

2. BACKGROUND

In the early 1990s, the City of North Vancouver launched a planning initiative to redevelop the City's waterfront and urban core areas. In approving this initiative, City Council required that planners address energy considerations along with land use. This requirement was unusual, since energy planning in British Columbia is normally left to provincial-scale organizations, such as BC Hydro for electricity and Terasen Gas for natural gas.

Local Councilors were invited by the Federation of Canadian Municipalities (FCM) to join an "energy mission" to Europe to visit up-to-date energy installations. The study tour of centralized district energy systems in Europe led the City to retain consultants to explore the potential for a district heating utility.

The pre-feasibility study found that land for a central, stand-alone plant was scarce in the area. The study also noted that a central plant would require significant up-front capital to develop and that in creating a central plant, the City would have to forgo funds from some other potential revenue-producing redevelopment on municipal land. Further, a central plant would result in high operating costs for 24-hour on-site staffing to monitor system operations.

3. THE POLICY

A team of consultants identified an alternative to the central plant approach - interconnected mini-plants, which rely on mini-boilers to heat hot water. The City's decision to pursue this option led to the establishment of the Lonsdale Energy Corporation (LEC). LEC is a public utility governed and regulated by the City of North Vancouver. The City entered into an agreement with Corix Utility, formerly Terasen Utility Services, which handles the development, maintenance, monitoring, servicing and the day-to-day operation of the Lower Lonsdale service area mini-plants.

The Bylaw

The city of North Vancouver established a Hydronic Heat Energy Service Bylaw to create a district heating service area for Lower Lonsdale, with a requirement that all new or retrofitted buildings greater than 10,000 square feet be connected to and use the system. This bylaw requires developers in the district to provide infrastructure to connect to the system, avoiding the construction of baseboard heating in the district. The bylaw also led to the establishment of the LEC. In 2003, the FCM provided $4 million in funding through the Green Municipal Fund. Ultimately, the local government retained the services of Corix Utility to handle development maintenance, monitoring, servicing, and day-to-day operation of the Lonsdale mini-plant. Since that time LEC has created two additional service areas and are currently managing these service areas directly without the involvement of a third party operator.

The System

In order to develop an efficient district heating system, local government staff needed to identify potential areas that would have a high demand for heating. Also, optimum areas would need to have a strong mix of land uses to allow for a variety of different energy demand cycles. The project required a close working relationship between planning staff and developers to ensure the proper integration of the district energy infrastructure into city works operations. Anticipated demand for heating was modeled for residential buildings, which influenced the size of the mini- plants. Currently, the LEC has developed detailed guidelines for developers' design teams to help implement the infrastructure design and controls needed to efficiently connect to the system.

Lonsdale Energy Corporation's system relies on high-efficiency gas mini-boilers to heat hot water, which is then piped underground to provide a heat source to residential towers, commercial space and a community center in the local service area. Once used, the water is recirculated back to the mini-plant for re-heating, then recirculated again to the connected buildings. The system avoids each building having its own boiler. System costs are recovered through usage charges authorized by bylaw.

4. ENERGY EFFICIENCY POTENTIAL

4.1. Policy Uptake

Lonsdale Energy Corporation was incorporated in 2003 to operate the system. The council acts as the tariff setter, regulating the rates charged by LEC. In February 2007, the City established a service area bylaw to introduce a second system, to be served by LEC, in the expanding Central Lonsdale neighborhood.

Currently, there are there are three energy service areas, 1133 customers and 3,000 units that use approximately 6 MWs of heat (expected to grow to approximately 11 MWs by 2010). To date 1,000,000 square feet of mixed-use buildings have been connected to the system. This is expected to increase to 3,000,000 square feet by 2010.

4.2. Energy Savings Potential

Anecdotal evidence suggests that buildings connected to the district heating system reduced their energy costs by approximately 15%.

From a performance standpoint, the district heating is much more reliable than conventional heating sources. If one plant fails the other plants continue to provide hot water. Mini-plants are well suited for urban environments, easily fitting into small areas in residential and commercial parking lots. The boilers are extremely efficient, providing a 95% rate of capture on heat energy and providing a production capacity of 6 MW serving 1,000,000 square feet so far. The boilers are very flexible, allowing for the use of a variety of different fuels and the easy integration of alternative energies like solar power. Although the system is performing well, the high grid temperature of 82 degrees Celsius constrains the number of fuel sources that can be used. The experience from the project has shown that running the grid at a lower temperature, provides greater access to a higher quantity of lower heat sources.

The project improves air quality through reducing nitrous oxide emissions by 64% and carbon dioxide emissions by 21% relative to conventional heating practice. The project has reduced GHG emissions by 4,070 tons a year, saving roughly 49,098 GJ in energy a year. The water based delivery system is ideal for integrating alternative fuel source such as solar energy. Economically, the rates for energy within the system are very competitive. The rates include a capacity meter and a commodity charge which allows for the energy demand for each customer to be tracked. The LEC operates on a 20-year financial cycle, providing roughly 4.5% rate of return on investment.

5. COST OF IMPLEMENTATION

5.1. Cost to the City

The total system capital cost was $8 million (in 2003 dollars): (1) $2 million loan from the City of North Vancouver; (2) $2 million from CORIX utility, and; (3) $2 million loan from the Federation of Canadian Municipalities.

Currently, there are 3 part-time employees at Lonsdale Energy Corporation (each employee has a dual role with the City and LEC). Contractors do some project review.

5.2. Cost of District Heating System

Several years may pass between the initial feasibility study and final completion of a district heating system, and a substantial investment in study and design fees will be needed prior to starting construction. An initial scoping study to

investigate whether there is any potential for district heating may be done for $10 – $15,000 or less. Much of the work can be carried out by local government staff, such as determining the availability and cost of fuel, the willingness of local building owners to participate, the likelihood of new development and distances between potential customers. Companies involved in developing district heating projects will often be willing to assist with early opportunity assessments at nominal cost. The Community Energy Association can also provide valuable help at this stage.

If the scoping study shows promise, a full feasibility study may be undertaken, involving a detailed investigation of technical and financial aspects of the project. This may include building demand loads, plant configuration, piping distribution, fuel supply and energy costs as well as potential financing arrangements. The cost of a feasibility study can vary widely depending on scope and complexity. A relatively simple study looking at district heating from natural gas in a new development might cost $25,000 – $50,000, while a complex study for a district heating system combined with wood waste cogeneration might be $150,000 – $250,000. Energy service companies may perform the feasibility study for free in exchange for the right to develop the project.

Construction costs will vary widely depending on the scope of the project, and will be different for each community. The following table includes numbers from actual projects.

Free-standing building to house boiler plant	$500,000 – $1,000,000+
Natural gas hot water boiler plant, 4 MW	$500,000 – $1,000,000
Wood waste hot water/steam boiler plant, 1.5 MW	$1,000,000 – $1,500,000+
Hot water distribution piping, existing development	$800 – $1.400/meter
Building connections, existing properties	$15,000 – $90,000/bldg
Engineering, construction management and other project administration	10% – 15% of capital cost

5.3. Cost to the Developer

The district heating program requires developers in the district to provide infrastructure to connect to the system, avoiding the construction of baseboard heating in the district. The cost of providing a water-piped heating system is approximately 5% of total project cost. In some cases, this incremental capital cost is financed by VanCity, a large local credit union, which recoup their costs through future energy savings.

6. ADMINISTRATIVE FEASIBILITY

6.1. Ease of Initiation

Implementation

Strong partnerships transformed the City of North Vancouver into a district heating leader in the province. For example, City of North Vancouver council provided leadership to motivate the engineering, financial, and planning professionals to mobilize the project internally. Another key partnership was the relationship with FCM, which provided low interest loans and grants for start-up funds.

As the plans progressed, the City selected the interconnected mini-plants system, requiring cooperation from the building community. All new buildings would need underground parking and selected sites would provide space in these underground lots for mini-plants of 4 to 6 high efficiency boilers. In moving from the planning of the system to the commissioning and operating of the system, the City of North Vancouver needed an experienced operator to provide design services as well as system and customer operations services (Corix). With this expertise and leadership Lonsdale Energy Corporation commenced operations in 2004.

Enforcement

The Lonsdale Corporation requires that developers post a performance bond to ensure compliance with the bylaw. This bond is normally around $50,000, but can increase to $100,000 if LEC anticipates that the project will require a high level of involvement from LEC staff and contractors.

Challenges

Taxes. Outside of local government, there was a key challenge related to the Provincial Social Service Tax Act (PST). Currently, major energy providers like Terasen and BC Hydro do not pay PST or charge it to residential customers. However, because the LEC is still a net user of natural gas they were charged PST and were also required to charge its customers PST, putting the LEC at a competitive disadvantage. The City of North Vancouver and LEC were successful in

convincing the province to amend the Social Service Tax Act. But the LEC is still required to pay PST on large natural gas purchases, an issue LEC continues to lobby to amend.

Regulation. Another key challenge relates to potentially competing regulations aimed at reducing greenhouse gas emissions and reducing particulate matter, given that some fuel sources (e.g., bio-energy) may represent a reduction in greenhouse gas emissions but an increase in particulate matter.

System Specification. Also, the efficiency of the boilers was underestimated in the original design, resulting in the over-sizing of the mini-plant boilers. The design originally estimated that five mini-plants be constructed to serve 3 million square feet, underestimating the efficiency of the mini-plants and boilers in the system and incorrectly forecasting the heating demands of the system.

6.2. Educational Outreach Requirements

The Lonsdale Energy Corporation focused their educational efforts on the developers and engineers with projects in the Lonsdale Quarter. Most of LEC's efforts were focused on facilitating project design and engineering to accommodate the necessary systems to connect to the district heating system. The level of developer and engineer education needed varies greatly.

7. STAKEHOLDER IMPACTS

7.1. Acceptability to the Developer Industry

According to Lonsdale Energy Corporation, developers have complained about additional cost of installing hydronic heating (vs. electric). This incremental cost of hydronic heat is, in part, offset by Terasen which provides boilers and recovers their cost in rates charged to City.

There have also been problems ensuring developers install hydronic systems that meet the necessary system specifications (e.g., target return water temperatures). There remains some uncertainty of if the system as designed will be capable of easily accommodating alternative heat sources.

One of the primary obstacles in implementing the program is the engineering community, which has had difficulty in designing buildings to appropriately accommodate the district heating system.

7.2. Acceptability to the Rate Payers

Lower Rates and Cost Savings for LEC Customers

LEC reduced its rate structure by more than 10% for customers. For residential customers, heating costs now vary between $0.08 and $0.09 per kWh, at an average cost of $0.0864 per kWh, LEC service is competitive considering all gas charges as well as the cost of boilers and their maintenance are included. The new rates are applied retroactively to the date when the control of each developer-built building was transferred to the building's strata corporation. Strata management companies will receive a full refund of the difference between the former rate and the new 2007 rate. This represents a more than $125,000 return to existing customers.

LEC also decreased its commodity charge by 6.7% to reflect current market prices. As of October 1, 2007, the commodity charge decreased from $0.04669 per kilowatt hour to $0.04356 per kilowatt hour. Customers saw a net decrease relative to their energy use.

The district heating program also affords the customer some cost savings. Previously, LEC was required to pay PST on its fuel purchases from suppliers and charge PST to customers who use LEC services. By comparison, utilities such as BC Hydro and Terasen Gas do not have to charge PST to its residential customers. The tax requirement placed LEC at a competitive disadvantage.

Part of the issue has been resolved through successful lobbying by LEC and the City. An amendment to BCs Social Service Tax Act & Regulations eliminated the PST on invoices to residential customers. However, PST is still required to be paid on natural gas purchases. To ensure that its valued residential customers are treated equitably, LEC is working to obtain a PST exemption on its gas purchases. Customers would then pay the same amount of PST as they would if they purchased natural gas directly from the gas providers.

Purchasing Power

LEC is in a unique position to make fuel purchase decisions based on the best rates available. Because each interconnected mini-plant is serviced by a distinct gas meter, LEC can purchase natural gas from the most economical provider and minimize costs by alternating heat generation between mini-plants. This flexibility enables LEC to offer

premium energy services to its customers at a reasonable price. As more buildings connect to the system, LEC can make high volume gas purchases that translate into additional savings for customers.

8. LESSONS LEARNED

Hybrid utility service models are a viable option for the delivery of distributed energy services. In North Vancouver, energy services were traditionally the responsibility of provincial agents, such as BC Hydro or Terasen Gas. Establishing a municipal utility service meant rethinking the best way to deliver competitive energy services to city residents. An open/expandable model allows for innovation, mitigates development and operational risk, and optimizes expertise, ingenuity, and rigor in the delivery of a particular community service.

Hybrid utility service models may be subject to requirements that do not apply to traditional utilities. As a net importer of natural gas, LEC had to pay provincial sales tax (PST) on the purchase of fuel from suppliers. LEC was also required to charge PST to customers benefiting from the thermal services provided by the LEC. Under provincial regulations, however, utilities such as BC Hydro and Terasen Gas do not have to charge PST to residential customers. The tax requirement placed the LEC at a competitive disadvantage. LEC and the City of North Vancouver have been successful at partly resolving the issue. Following an amendment of BC's Social Service Tax Act and Regulations, PST is no longer charged on the invoices to residential customers. However, PST is still required to be paid on natural gas purchases and LEC is continuing its work to have this requirement removed.

Municipalities can encourage uptake of district energy through planning practices. For the City of North Vancouver, the process of undertaking an energy plan led to identifying sites within the municipality that would have a high demand for heating, as well as a mix of building types. The process contributed to the City acknowledging a need for contractual obligations with builders purchasing City-owned land to connect to district energy. As part of the rezoning process for development on City-owned lands, connection to the LEC is required and is treated like other municipal infrastructure requests, such as provisions for sidewalks, roads, sewer connections, and stormwater management. Before any development proceeds, every builder must sign a heat service contract. Because of this agreement, every customer pays the same rate for heating.

High-performing district energy systems demand a new approach to engineering and building design. As interest in district energy systems has grown, so has the awareness of the need to accurately model the efficiency of a district energy system. For the LEC, engineering design teams at first over-estimated heating demand for residential buildings, resulting in the over-sizing of the mini-plants. Local developers' engineering design teams were also unfamiliar with the controls needed to ensure optimal operation of the mini-plant boilers. Management and operational staff of the LEC have since introduced detailed guidelines for developers' design teams to help implement the infrastructure, design, and controls needed to connect to the district energy system. LEC also works closely with owners' or developers' design engineers to streamline the preparation of designs.

9. REFERENCES

Glenn Stainton, Vice-President Operations, Lonsdale Energy Corporation

http://www.toolkit.bc.ca/success-stories/district-heating-north-vancouver

http://www.lonsdaleenergy.ca/

CASE STUDY: LONDON DECENTRALISED ENERGY POLICY

1. THE POLICY

The London Plan (spatial planning policy for London) was adopted in February 2004 by the Greater London Authority. The London Plan 2004 includes detailed policies requiring new development: 1) to consider energy efficiency as a core part of design; 2) to provide minimum of 10% of energy supplied through renewable means and; 3) to incorporate district heating (supplied where appropriate by Combined Heat and Power) unless it can be proved not technically or financially feasible The Mayor also established a basic energy hierarchy of "reduce demand, supply efficiently and supply renewably" as well as a list of preferred heating technologies to be applied starting with district heating and CHP.

The Mayor of London sees renewable energy and district heating within new development as key tools in the strategy to reduce London's carbon footprint. The Mayor has an overarching target of decentralizing 25% of London's energy supply by 2025. In 2008, an updated version of the London Plan was adopted which included new policies which strengthened the requirement for district heating and increased the percentage of renewable energy required to 20% to help achieve the Mayor's target.

The text of the updated London Plan policies is:

4A.5 Provision of heating and cooling networks

Boroughs should ensure that all Development Plan Documents (DPDs) identify and safeguard existing heat and cooling networks and maximize the opportunities for providing new networks that are supplied by decentralized energy. Boroughs should ensure that all new development is designed to connect to the heating and cooling network. The Mayor will and boroughs should work in partnership to identify and to establish network opportunities, to ensure the delivery of these networks and to maximize the potential for existing developments to connect to them.

Policy 4A.5i Decentralized Energy: Heating, Cooling and Power

The Mayor will and boroughs should in their DPDs require all developments to demonstrate that their heating, cooling and power systems have been selected to minimize CO_2 emissions. The need for active cooling systems should be reduced as far as possible through passive design including ventilation, appropriate use of thermal mass, external summer shading and vegetation on and adjacent to developments. The heating and cooling infrastructure should be designed to allow the use of decentralized energy (including renewable generation) and for it to be maximized in the future. Developments should evaluate combined cooling, heat, and power (CCHP) and combined heat and power (CHP) systems and where a new CCHP/CHP system is installed as part of a new development, examine opportunities to extend the scheme beyond the site boundary to adjacent areas. The Mayor will expect all major developments to demonstrate that the proposed heating and cooling systems have been selected in accordance with the following order of preference:

- *Connection to existing CCHP/CHP distribution networks;*
- *Site-wide CCHP/CHP powered by renewable energy;*
- *Gas-fired CCHP/CHP or hydrogen fuel cells, both accompanied by renewables;*
- *Communal heating and cooling powered by renewable energy;*
- *Gas fired communal heating and cooling.*

2. ENERGY EFFICIENCY POTENTIAL

2.1. Policy Uptake

The London Plan policies affect all development that is referable to the Mayor – which is defined as "major development" (includes residential development over 500 units, commercial development over 10,000 square meters, 20,000 square meters or 30,000 square meters depending on location and buildings over 30 stories). This is approximately 200 applications per year. The London Plan also sets guidelines for the 30 London Boroughs, many of which are also actively pushing the London Plan policies on smaller projects and some of which have adopted the policies themselves within their Local Plans.

2.2. Energy Savings Potential

The energy saving potential is significant as the London Plan pushes developers to achieve higher standards than the Part L of the building regulations. It is also encourages the development of district heating (with Combined Heat and Power (CHP) where adequate density exists) and to incorporate renewable energy technologies. A study undertaken by the South Bank University analyzed 113 energy statements from 350 approved applications since 2004 (at the time the analysis was conducted there were 617 developments reported to the Mayor since the publication of the London Plan - of these 350 developments were approved, 244 were pending, and 23 were refused) The study showed that most developments were able to achieve close to 10% carbon saving from renewable energy technologies and overall the developments improved their energy efficiency performance by 25% from baseline. The report also states that the biggest percentage of savings comes from CHP, biomass and Ground Source Heat Pumps (GSHP).

Table from '*Review of the impact of the energy policies in the London Plan on applications referred to the Mayor (Phase 2) July 2007*'

	Savings to date from 113 energy statements		**Savings to date – scaled for 350 developments**
	Metric tons CO_2/yr[1]	*%*	*Metric tons CO_2/yr*[1]
Energy Efficiency	111,492	21.3	345,329
Renewable Energy	24,039	5.8	74,457
Total	135,528	25.8	419,777

[1] - Summary of CO_2 savings from energy statement data and extrapolated to 350 developments (Scaling based on 350/113)

3. COST OF IMPLEMENTATION

3.1. Program Cost

The policies themselves were developed over a number of months in house by the GLA energy team (2.5 full time staff) and the participation of planning officers and consultation with the Combined Heat and Power Association (CHPA).

Consultants were engaged at various points during the process to provide background research reports at a cost of tens of thousands of pounds at a time.

3.2. Cost to the Developer

It is not known what the additional cost to the developer will be – there will upfront consultancy fees to pay for an energy feasibility study to assess the most appropriate strategy for carbon reduction, use of renewables and district heating. Additional cost will be required to deliver the higher performance but no data has been collected to quantify this cost.

4. ADMINISTRATIVE FEASIBILITY

4.1. Administering Agency

Each planning application requires the time of one member of the energy team to assess the energy strategy submitted with a planning application. That person usually has a number of meetings with the developer and the GLA planners in advance of the planning application being submitted. When the London Plan first came out there was one full time member of staff responsible for assessing the energy strategies, there are now 4 full time members of staff on the energy team. Each local authority where the proposed development is located should also make an assessment of the energy strategy – some authorities have sustainability or energy officers who take this on as a small part of their role, others employ consultants to assist. Others leave the assessment to the GLA.

4.2. Ease of Initiation

The policies were relatively easy to get written into the London Plan due to the Mayor's interest in climate change. See Section 5.1 for details about the Examination in Public for the further alterations to the London Plan.

4.3. Educational Outreach Requirements

The GLA developed a renewable energy toolkit including benchmark data, calculations and case studies to help developers assess the suitability of their projects for renewable energy technologies, and also provided educational outreach through training sessions for London Borough Planning Departments and the developer community. The cost of developing the toolkit was approximately $120k, and developing and running the training sessions a further $100k. The GLA also provided funding to develop university courses in planning to help educate the new generation of planners in energy policy and technology. A telephone helpline was also provided for local authority planners funded, in part, by the GLA and by the Energy Saving Trust.

5. STAKEHOLDER IMPACTS

5.1. Acceptability to the Building Industry

The London Plan policies relating to energy were not received well by the development community. The Mayor received letters from the developers arguing against the rationale of the policies requiring a set amount of renewables and CHP. While not totally against energy efficiency improvements, they wanted to have the flexibility to achieve higher performance, and were resistance to the City's use of prescribed technologies. Furthermore, many developers ran into difficulties complying with the new policies. Many planning applications submitted within the first year or so of the Plan's adoption did not include sufficient renewable energy or a suitable consideration of CHP. The Mayor rejected the schemes and developers were forced to reassess their plans and to come back with some renewable energy incorporated.

After the publication of the London Plan, the GLA commissioned a Carbon Scenarios study for London, which concluded that the only viable strategy to achieve the carbon reduction targets set by the Mayor would be through CHP and large scale wind and biomass. The GLA planners and energy team recognized the importance of networks and anchor loads as a means to incorporate larger scale renewables into the London system. This resulted in new policy drafts which were included in the further alteration to the London Plan (as detailed above). During the Examination in Public (EiP), the Combined Heat and Power Association (CHPA) defended the policy while the developers and their consultant teams argued against it. Ultimately, the inspector ruled in favor of the Plan policies. Following the Inspector's decision, the Government Office for London introduced an amendment to require London Boroughs to proceed with developing more detailed district heating schemes.

Developers have since approached the requirement for district heating in different ways. Some developers have altered their product mix to have higher density and include mixed use, in order for CHP and a district network to be technically feasible. One residential private developer is so pleased with one scheme, that they are building a spur across a bridge over the Thames to connect another development to the network. A second residential developer is having problems with the service agreement provided by the Energy Services Company (ESCo).

In October 2008 a report was released by London First, a business membership group (representing 25% of London's GDP and 17% of all London's employees), which investigated the barriers to delivering the Mayor's target of decentralizing 25% of London's energy supply by 2025. Although originally commissioned to demonstrate to the GLA that the target could not be achieved, the report dos not corroborate this view, and in stead, offers various strategies for achieving the target. Though most of the developers support the concept, they remain skeptical of the approach and are demanding a more robust strategy. The report also details the myriad barriers to achieving the target and suggests mechanisms for its delivery, which include:

- Establishing a body called Energy for London (EfL) to act as a public sector lead and strategic integrator to work with boroughs, energy companies and developers to deliver the plan
- Boroughs and EfL to develop project specific public private partnerships to deliver projects with private sector investment
- Boroughs to map heat loads and major developments (including estate renewal), developing energy masterplans identifying specific projects
- Public sector to commit to connect 'anchor tenant' heat loads to kick start build out of decentralized energy schemes and to address emissions from existing stock
- Private sector energy companies to expand their current decentralized energy provision to meet this demand for investment based on the improved business case

- Greater London Authority to establish a Green Fund to fund new near site decentralized energy infrastructure through section 106 development contributions
- EfL to establish London wide standards and technical specifications for heat networks including consumer protection agreements and guarantees of minimum service level agreements
- Specific incentives for CHP (obligation or minimum floor price for electricity output

A number of these recommendations may be useful for Seattle.

6. REFERENCES

- London Plan 2004
- Review of the impact of the energy policies in the London Plan on applications referred to the Mayor (Phase 2) July 2007
- Further Alterations to the London Plan 2008
- Cutting the Capitals Carbon Footprint – Delivering Decentralised Energy 2008
- Interview with Michael King, Associate, CHPA

New Buildings Policies – Summary Assessment **12/2/2008**

SUMMARY POLICY SCORECARD		Energy Efficiency Potential	Economic Impacts	Cost of Policy Implementation	Cost Effectiveness	Administrative Feasibility
		Rating (★ - ★★★★★)				
Financing and Incentives	Green Investment Fund	★	★	★★	★	★★★
	Green Building Feebate	★★★	★★★	★★★	★★	★★★
	Density Bonus	★★	★★★	★★★	★★★★★	★★★★
	Priority Green Permitting	★★	★★	★★★	★★	★★★★
Mandates	Green Building Performance Standards	★★★★	★★★★	★★★	★★★★	★★★
	Green Building Code	★★★★★	★★★★★	★★★	★★★	★★★
	Energy Code Updates	★★★★★	★★★★	★★★	★★★	★★★

Seattle Green Building Task Force
New Buildings Committee

EDAW / DMJM H&N

Appendix D: Existing Building Policy Scorecards

Mandate - Disclosure

Disclose Building Historical Energy Use

POLICY DESCRIPTION
Building owners could be required to disclose the historical energy use of their buildings. Owners would be required to report utility data for a specified time frame (e.g., last 5 years). These data could then be held in a public database and accessed by any investor to help inform purchasing decisions. This option could also be implemented as a voluntary program and coupled with upgrade incentives and financing mechanisms.

POLICY OBJECTIVE
To increase information available to building owners and occupants, create a mechanism for market differentiation, and encourage voluntary upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★	Cost of Policy Implementation	★★★
Economic Benefit	★	Administrative Feasibility	★★★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★

- **Little incentive for measure implementation:** Effectiveness hinges on ability of information alone to provide sufficient motivation to follow through with efficiency upgrades. Historical data also do not provide any guidance on what measures should be implemented.
- **Does not account for normal fluctuations in energy consumption.** Historical use data alone do not account for changes in weather and homeowner or business activity over time that will influence energy use.
- **Motivation only for buildings that are below average.** Providing energy use data would need to be compared to some benchmark to demonstrate how well a building is performing. Even in this context, historical data will only be a motivating factor for buildings that fall below the benchmark. Consequently, some potential upgrades will be missed in "above average" buildings.
- **Broadly applicable across sectors and measures**: Historical billing data could be obtained for all sectors. Policy could apply equally to all fuels (gas, oil, steam, electricity) and measures within these sectors.

ECONOMIC BENEFIT — Rating: ★

- **Low economic potential.** Given the issues discussed above that limit the energy efficiency potential, it is unlikely that simply disclosing historical billing data will result in many new measure installations. As a result of the limited energy efficiency potential, the economic benefit of this policy is low. Based on economic modeling, this policy had the lowest overall impact among all the policies reviewed.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to city and partners of establishing this policy is estimated to be $80,000 - $170,000.
-**Assessment of disclosure methods: $10,000 - $30,000.** The City would need to assess the trade-offs and methods for requiring natural gas and electricity use disclosure and how to address landlord-tenant privacy concerns and other disclosure issues.
-**Development of database: $50,000 - $100,000.** A public database could be developed to house and provide access to the ratings. Alternatively, existing databases could potentially be leveraged for residential and commercial ratings, respectively. The database would likely require more security than for a performance checklist but less complexity than for a performance rating.
-Legislative development: $20,000 - $40,000. City staff and legal counsel would need to develop the policy specifics and legislation. Much of this work could be done within existing staffing levels, meaning few new resources needed.

Mandate - Disclosure

Disclose Building Historical Energy Use (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★★★

-Few technical challenges appear to stand in the way. For example, both Seattle City Light and Puget Sound Energy have approximately five years of data in their records. By state law, the utilities must abide by strict customer confidentiality rules, but with written customer request they can disclose data. If billing records were uploaded to a database, it would likely have to be done in a manner that preserved the confidentiality of the customer.

- **Privacy concerns can raise legal questions that are usually surmountable.** Any mandate that requires public disclosure of customer data or compromises landlord-tenant privacy could raise potential concerns. Most existing programs have avoided the most significant legal hurdles by requiring customers to disclose data (rather than utilities) and by limiting the policy scope for particularly challenging sectors (e.g., commercial tenants).

- Compliance mechanisms may be needed, but potentially difficult to enforce: If disclosure is mandated, an enforcement mechanism will need to be defined and a public authority must be in charge of monitoring compliance.

STAKEHOLDER IMPACTS

This policy would likely place the greatest burden on utilities and other providers, but the affects can likely be mitigated:

-Utilities would need to provide data. Requiring historical energy use disclosure would necessarily involve the active participation of Seattle City Light, Puget Sound Energy, and other energy providers to release data (with written customer request). Depending on the scope of the program, utilities could potentially handle the requests with existing staff but may need to hire additional customer service representatives to handle requests. Nevertheless, the utilities would also benefit from the energy conservation benefits of the policy.

-**Residential homeowners.** Disclosing energy use history without considering all the factors that cause energy-use variation could raise equity concerns. There are many reasons why energy use is much higher for certain properties. The size of a family, the number of hours worked out of the home, the age and health of family members, and other lifestyle factors can influence a home's energy use.

-Commercial building owners. As with residential buildings, variations in energy use of a commercial property are sometimes more related to the activities of the occupants than to the building itself, potentially raising equity concerns for a policy that is based only on energy use and not on other factors related to a building's performance. Building owners would have to obtain permission from tenants to release energy data.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

The following three jurisdictions have recently established a system for disclosing historical building energy use:

-Montgomery County, MD, will be requiring homeowners to disclose energy use and costs to prospective buyers.

-**The State of California** will require building owners to disclose their Portfolio Manager benchmarking energy use data (and ratings) to a prospective buyer, lessee, or lender as of 2010. (This Assembly Bill 1103 will also require electric and gas utilities to maintain at least 12 months of records for all nonresidential buildings in a format compatible with Porftolio Manager.)

-**Gainesville, FL**, has developed an interactive database that allows homeowners served by the public utility to view their current and past energy use and compare with other homes.

Additional lessons can be learned from several jurisdictions currently considering this option. Among them:

-**Portland, OR** has found that disclosing energy use has been their biggest challenge. They can require building owners to report data, but disclosure would be harder to require for sub-metered (and potentially other) tenants. Portland will be developing a request form (reportedly similar to that in California) for owners to use with tenants, but without the legal authority, compliance cannot be mandated.

-**Austin Energy** considered an approach requiring the seller to provide data (not the utility) but concluded that the biggest factor in energy consumption was owner lifestyle and behavior (as opposed to performance of the building structure and systems) and that historical energy use alone would not be particularly meaningful.

Key lessons learned:

-Utilities can help play a leading role in trouble-shooting customer privacy concerns and legal issues.

-Developing consumer education is a key piece of this policy option. Prospective buyers must be informed about how to interpret historical energy data and to what degree it should inform their buying decisions.

-This policy could aid the implementation of other policies (e.g., as an input into a full audit) or be used as a way to evalute and track the success of a policy or incentive.

Mandate - Disclosure

Disclose Building Energy Performance (Checklist)

POLICY DESCRIPTION

Building owners could be required to disclose the energy performance of their buildings using a common checklist of energy efficiency measures. The checklist would include a set of the most common and cost effective measures which, if implemented, would achieve a desired level of energy performance. Completion of the checklist would be required (likely by a third-party auditor) at building time-of-sale, by a certain date, or as a prerequisite for financing and then disclosed to prospective buyers or tenants or to the general public. Properties could be "rated" based on the number of measures achieved out of the total included on the list (e.g. a property would be rated a "4" if 4 out of 10 measures are present at the time of disclosure).

POLICY OBJECTIVE

To increase information available to building owners and occupants, create a mechanism for market differentiation, help identify opporturtunities for efficiency gains, and encourage voluntary upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★	Cost of Policy Implementation	★★★
Economic Benefit	★★★★	Administrative Feasibility	★★★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★

- Broadly applicable across sectors and measures: An energy performance checklist is applicable to both residential and commercial building types. Policy applies equally to all fuels (gas, oil, steam, electricity) and could include all measures for each fuel type.

- Little incentive for measure implementation: Effectiveness relies on the ability of the checklist information alone to provide sufficient motivation to owners to follow through with efficiency upgrades. Policy does provide some guidance on which measures should be adopted. Tying this disclosure policy to financial incentives could increase the energy efficiency potential.

ECONOMIC BENEFIT — Rating: ★★★★

- Moderate economic potential: The broad range of applicable measures and the specificity of the checklist in providing direction as to what measures need to be installed provide a modest amount of efficiency potential. This results in a moderate amount of potential economic impact. Based on the economic impact modeling, this policy ranked in the upper third of policies reviewed in terms of potential economic output and jobs.

- Applicable to all sectors: This policy could be feasibly implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits include installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.

- Job growth to the energy auditor industry. Requiring assessments of building performance would encourage growth in the number of energy auditor jobs.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to city and partners of establishing this policy is estimated to be $60,000 - $190,000.

-**Development of appropriate checklists: $20,000 - $50,000.** Sample checklists from other jurisdictions are easily available and the technical capacity to develop the checklist likely exists primarily in-house. Some consultant research may be needed to assess energy benefits of checklist items.

-**Development of database: $20,000 - $100,000.** A public database could be developed to house and provide access to the ratings, and complexity and security requirements for a checklist approach would likely be less than for a performance rating approach. Alternatively, existing databases could potentially be leveraged for cost savings.

-**Legislative development: $20,000 - $40,000.** City staff would be needed to develop the policy specifics and legislation. Much of this work could be done within existing staffing levels, meaning few new resources needed.

Mandate - Disclosure

Disclose Building Energy Performance (Checklist) (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★★★

Establishing a requirement for an energy performance checklist is quite feasible.

- Few technical or legal challenges appear to stand in the way. In the residential sector, checklists are generally easier to develop than performance ratings because they don't require quantitative assessments of performance. In the commercial sector, checklists can sometimes be more difficult than performance ratings because buildings vary so greatly: measures that are very suited to one type of building may not be applicable (or most applicable) to other types of buildings. Note that in both sectors, potential legal hurdles concerning disclosing energy use data are absent.

- **Quality assurance can be an ongoing maintenance concern.** Checklist results can vary depending on who completes the assessment. For the best results, a certified energy auditor should complete the checklist, but this can sometimes be nearly as time intensive and costly as an energy audit.

- **Compliance mechanisms may be needed, but potentially difficult to enforce.** If disclosure is mandated, an enforcement mechanism will need to be defined and a public authority must be in charge of monitoring compliance.

STAKEHOLDER IMPACTS

This policy is expected to have the greatest impact on homeowners but the effects can likely be mitigated:

-**Residential homeowners** would be affected financially, as the cost for a performance checklist can be approximately $100 to $300. Owners could also be impacted by a policy that required disclosure at time-of-sale, which could potentially delay a transaction, although some jurisdictions allow this responsibility to be transferred to the buyer. Similarly, realtors could be impacted if their clients' sales are delayed or otherwise affected, but checklist approaches are generally considered less of a burden than ratings and are sometimes considered to be easier to understand and less confusing than a rating or label. Homeowners (and realtors) could also benefit from higher home sale prices for higher performing homes.

-**Commercial building owners** would be similarly affected, although many building owners already perform energy audits and the cost is not expected to be as great of a burden.

-**Low-income homeowners** could face particular difficulty with the cost of required performance audits. On the other hand, low-income tenants would stand to benefit from lower utility bills and the potential for greater knowledge about the energy use of prospective rental units. Consideration and quantification of utility cost savings and offering of low-income exemptions have generally been important considerations for low-income residents and their advocates.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

Few cities require use of a building energy checklist. A sample of those that do include:

-**Berkeley and San Francisco, CA** both use checklist-type approaches as part of their Residential Energy Conservation Ordinances (RECO). While the checklists have been useful for several years, both Cities are currently considering moving to performance-based ratings due to the ability of ratings to help homes move further beyond the baseline measures set out in the existing checklists.

-**Chicago, IL** provides a home energy checklist audit to low income residents as a piggy-back to three other residential home upgrade programs. City staff are already charged with visiting homes to provide other services (e.g., lead abatement, disability accommodation) and now provide energy efficiency audits in the same visit.

Several cities throughout the country are planning to move forward with checklist-based options:

-**The Denver Board of Realtors** launched a pilot in September 2008 that involves a voluntary home energy checklist to be completed by a contractor (SunPower) as part of a mini-audit. The Denver Board of Realtors is partnering with the City and with a local university in the effort and will provide valuable lessons.

-**Austin, TX** is proposing to develop an in-house, 8-item audit checklist for homeowners. They have not yet received final approval from City Council, but have strong support and are expecting the measure to pass in late 2008.

Key lessons learned:

-Other cities have found that checklists can offer a good middle ground between energy use disclosure and energy audit performance disclosure, at least for homeowners. Checklists offer more "actionable" information than historical energy use yet can be easier to conduct than performance ratings. On the other hand, checklists do not provide as much ability to compare one home to another or to quantitatively assess potential efficiency gains.

Mandate - Disclosure

Disclose Building Energy Performance (Rating/Label)

POLICY DESCRIPTION

Building owners could be required to disclose the energy performance of their buildings using a common rating or label. Rating systems typically use a combination of energy use records and in-person audits to develop a performance "score" (sometimes accompanied by a more detailed assessment) that enables comparision of buildings. Ratings typically must be performed at either building time-of-sale or by a certain date and then disclosed to prospective buyers or tenants or to the general public. Performance-based rating systems exist for both residential and commercial buildings, and several options are currently used (or in pilot phase) around the country. This option could also be implemented as a voluntary program and coupled with upgrade incentives and financing mechanisms.

POLICY OBJECTIVE

To increase information available to building owners and occupants, create a mechanism for market differentiation, help identify opportunities for efficiency gains, and encourage voluntary upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★	Cost of Policy Implementation	★★★
Economic Benefit	★★★★	Administrative Feasibility	★★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★

- **Broadly applicable across sectors and measures:** An energy performance rating is equally applicable to both residential and commercial building types. Policy applies equally to all fuels (gas, oil, steam, electricity) and could include all measures for each fuel type.
- **Low to moderate incentive for measure implementation:** Effectiveness relies on the marketing value of the rating or label to motivate building owners to pay for the efficiency upgrades. Labels such as LEED and ENERGY STAR typically provide requirements for efficiency for various end uses and measures, so some direction is provided on which measures need to be installed. Tying this policy to financial incentives or mechanisms to help pay for these measures could result in greater energy efficiency potential.

ECONOMIC BENEFIT — Rating: ★★★★

- **Moderate economic potential:** The broad range of applicable measures and the specificity of the checklist in providing direction as to what measures need to be installed provide a modest amount of efficiency potential. This results in a moderate amount of potential economic impact. Based on the economic impact modeling, this policy ranked in the upper third of policies reviewed in terms of potential economic output and jobs.
- **Applicable to all sectors.** This policy could be feasibly implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits include installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.
- **Job growth to the energy auditor industry.** Requiring assessments of building performance would encourage growth in the number of energy auditor jobs.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to city and partners of establishing this policy is estimated to be $180,000 - $450,000.

- **Assessment of existing rating systems: $50,000 - $200,000.** Experience to date has indicated that existing rating systems must be vetted in the marketplace before making mandatory. ENERGY STAR is well-established for commercial buildings. A current pilot in Portland, Oregon may help shorten the development time for residential ratings, but extensive work might still be needed.
- **Development of database: $100,000 - $200,000.** A public database could be developed to house and provide access to the ratings. Alternatively, existing databases (such as the Multiple Listing Service or EPA's Portfolio Manager) could potentially be leveraged for residential and commercial ratings, respectively.
- **Legislative development: $30,000 - $50,000.** City staff and legal counsel would need to develop the policy specifics and legislation. Much of this work could be done within existing staffing levels, meaning few new resources needed.

Mandate - Disclosure

Disclose Building Energy Performance (Rating/Label) (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY **Rating:** ★★★

Establishing a requirement for building energy performance is generally quite feasible, if potentially lengthy.

- **Most jurisdictions have taken at least a year to study similar policies.** The steps discussed above under *Cost of Policy Implementation* can take one to two years (or more) to test models, establish in-person audit and historical data procedures, and iron out details.

- **Privacy concerns can raise legal questions that are usually surmountable.** The development of a performance rating would likely require at least 12 months of energy use data. Any mandate that requires public disclosure of customer data (via utilities) or compromises landlord-tenant privacy could raise potential concerns. Most existing programs have avoided the most significant legal hurdles by carefully developing disclosure agreements, limiting any public disclosure to the end ratings and not the input energy use data, and by limiting the scope of the mandates for particularly challenging sectors (e.g., commercial tenants).

- **Compliance mechanisms may be needed, but potentially difficult to enforce.** If disclosure is mandated, an enforcement mechanism will need to be defined and a public authority must be in charge of monitoring compliance.

STAKEHOLDER IMPACTS

This policy is expected to have the greatest impact on homeowners but the effects can likely be mitigated:

-**Residential homeowners** would be affected financially, as the cost for a performance rating varies between $150 and $700, depending on the complexity. Owners could also be impacted by a policy that required disclosure at time-of-sale, which could potentially delay a transaction, although some jurisdictions allow this responsibility to be transferred to the buyer. Similarly, **realtors** could be impacted if their clients' sales are delayed or otherwise affected, but some realtors have used energy performance ratings to help differentiate their clients homes in a tight market. Homeowners (and realtors) could also benefit from higher sale prices for higher performing homes.

-**Commercial building owners** would be similarly affected, although many building owners already use Portfolio Manager. Obtaining the ENERGY STAR performance rating requires the stamp of a professional engineer, which would require some cost. In cities throughout the country, building owners have generally recognized the value in performance audits, particularly systems such as Portfolio Manager.

-Low-income homeowners could face particular difficulty with the cost of required performance audits. On the other hand, low-income tenants would stand to benefit by lower utility bills and greater knowledge about the energy use of prospective rental units. Consideration and quantification of utility cost savings and offering of low-income exemptions have generally been important considerations for low-income residents and their advocates.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

The following jurisdictions have established a requirement for disclosing building energy performance:

- The State of California. -- Will be requiring commercial buildings to use Energy Star Portfolio Manager and disclose results to a prospective buyer, lessee, or lender (effective 2010). Their companion residential bill is not likely to pass, but will likely be reintroduced during the 2009 legislative session.

- **Washington, D.C**. -- Will be requiring commercial buildings to use Energy Star Portfolio Manager and publicly disclose results. The bill is modeled after the California legislation.

-**Boulder County, CO--**Follow-up after audits has been very important. Audits are tagged with upgrade/ technology subsides and educational resources to do self- improvements or to select a pre-approved contractors.

In addition, several other jurisdictions are considering energy performance ratings. Among them:

- **New York City** is considering a requirement that commercial buildings over 50,000 sq. ft disclosure energy use annually in Portfolio Manager. Portfolio Manager ratings (not energy use) will be made public on the City's web site.

- **Portland, OR** is considering a similar requirement for commercial building owners to use Portfolio Manager for buildings over 20,000 square feet.

- **Washington State's** Climate Action Team is investigating a state-wide benchmarking requirement for commercial buildings using Portfolio Manager.

Key lessons learned:

-- Energy Star / Portfolio Manager has wide acceptance and is likely the best starting point for a commercial building rating. However, LEED-EB and ASHRAE 100 are also mentioned by some cities as contenders.

-- Approaches to residential homes vary widely and many are still in pilot. The Home Energy Rating System (HERS), the National Energy Audit Tool (NEAT), and the Energy Performance Score (EPS) ratings are considered the leading models for existing-home residential ratings at this point.

Innovative Repayment Mechanism

On-bill Financing

POLICY DESCRIPTION

City Light (or potentially Puget Sound Energy) could facilitate the repayment of loans for efficiency upgrades on utility bills. Upgrades would be selected by the building owner (in coordination with the City) such that the efficiency savings would pay for the investment over a fixed period of time. Customers would "share" monthly energy efficiency savings with the utility until the loan is paid back, at which point all savings would be reflected in lower monthly bills.

POLICY OBJECTIVE

To simplify loan repayment and (in combination with a funding source) reduce upfront cash outlay by property owners. In addition, some models of on-bill financing would allow for the loan to remain with the property (even if sold by the current owner), thereby sharing the cost of upgrades over time with future beneficiaries of those upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★	Cost of Policy Implementation	★
Economic Benefit	★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★

- **Applicable across sectors and to higher cost measures:** On-bill financing could be applied to all sectors, but is generally relevant for only those higher cost measures (e.g., window upgrades, insulation, heating system upgrades) that may require financing. CFLs, for example, are a measure that would not likely benefit from this policy. The policy by itself does not provide any guidance as to which measures should be installed.
- **Lack of financing hasn't been a primary barrier:** While this policy has intuitive appeal, other on-bill financing programs have shown that making financing available and convenient is not enough to encourage widespread upgrades. Given the recent credit crisis, however, the need for financing may re-emerge. Regardless, those that are in most need of financing are also those with poor credit, which adds risk to this policy.
- **Savings and repayment on utility bills could appeal to commercial and residential renters:** Tenants who pay their own utility bills may find this policy attractive, as it allows them to perform equipment upgrades with no up-front cost. Tenants who remain in the same building through the payback period would benefit from the full cost savings available from this policy, as opposed to renters who moved while they were still sharing savings with the utilities. Commercial renters typically stay in a building space for longer durations and are likely to have greater opportunity to benefit.
- **Costs and savings could potentially stay with the property**: Some models of on-bill financing can attach the cost/savings of energy efficiency upgrades to the meter, which provides continuity for benefit/payback from owner to owner.

ECONOMIC BENEFIT — Rating: ★★

- **Low economic potential:** Given the fact that lack of financing options has not been a large barrier for adopting measures, the energy efficiency potential for this option is low. Similarly, based on our modeling, this policy (on its own) ranked low in economic impacts.
- **Applicable to all sectors:** This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy, as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★

- **High initial costs to develop new billing system**: $1,000,000 - $10,000,000. City Light reports that a new billing system would be required in order for the City to administer on-bill financing. Installation of this new billing system would require a significant, three- to five-year effort that would cost tens of millions of dollars. Current plans are to upgrade the billing system in two to five years, and so implementing a policy that required a new system any sooner would likely require millions of dollars of additional funds.
- **Assessment of policy details**: $20,000 - $100,000: Apart from the billing system upgrades, the City would need to assess the various intricacies of on-bill financing models, including establishing procedures for dealing with non-payment.

Innovative Repayment Mechanism

On-bill Financing (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★

-City Light's current billing system poses a technical challenge: The current billing system cannot handle true "on-bill" financing. Using the current system, the utility would need to establish another account for each property's loan. Accordingly, ramp-up for this policy would be slow, as City Light is not planning on a new system for two to five years.
-Legal concerns could arise from non-payment: Experience in other jurisdictions (and previously at City Light) has indicated that questions remain about the ability of a utility to disconnect service if a customer has paid for its energy but not for the repayment on its loan.
-Lenders may be wary of repayment allocation: When customers partially pay their bills the repayment allocation (e.g. who gets paid first) becomes important. If a third-party financier is used, the gas or electric bill will be paid first, increasing risk to the lender. For NW Natural Gas, this was a deal-breaker and effectively ended its program.
-On-bill financing is very scalable: On-bill repayment of loans could be used for all loan amounts, targeting all kinds of efficiency upgrades. State law limits utility loans to a ten-year term.

STAKEHOLDER IMPACTS

Though feasible, on-bill financing is likely to have the greatest impact on utilities.
-**Utilities** would be the primary implementers of this policy and would be expected to bear the costs of administering the on-bill repayment mechanism. While **PSE** believes its billing system could likely handle such a mechanism, implementing the change would still be a significant undertaking (including additional staffing and software needs). For **City Light**, on-bill financing would require a new billing system, likely in advance of its next scheduled upgrade. Depending on the capital source and administrative structure for the loan fund, at least one new staff person would be needed to manage on-bill repayment of loans.
-**Building owners** would enjoy a range of benefits, depending on how the policy is implemented. At the least, repayment of a loan on the utility bill is expected to provide a convenience to the customer, as a separate monthly loan bill is not needed. More importantly, the goal of on-bill financing is to help customers see net savings immediately, where utility bill savings offset loan repayment. Some models of on-bill financing also enable the loan to remain with the property.
-Investors/Banks. Financers would likely be cautious if the energy portion of the bill was primary to the loan portion of the utility bill. This concern was a dealbreaker for a program by **NW Natural Gas** in Oregon. However, given that they are generally shorter-term utility customers, renters are also the least creditworthy borrowers for any financing option
-**Prospective buyers** and their lenders could be wary of an additional financial obligation over and above the normal utility bill. However, the goal would be for the energy savings to be greater than the loan obligation, so this fact could instead be a benefit. Nevertheless, a clear and standard means of communicating this benefit would be needed.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

The following jurisdictions have established, or are in the process of establishing, on-bill financing systems:
-**Midwest Energy** pays contractors directly to perform upgrades and adds the loan repayment charge to the residential customer's bill. Charges must be less than 90% of the estimated monthly savings, ensuring a net savings.
-**San Diego Gas & Electric** manages a commercial loan program with zero-percent interest rates and on-bill repayment. Minimum loan size is $5,000 and maximum is $50,000. Loans are unsecured; default on the loan results in meter shut-off.
-**National Grid (New England)**: Small/Mid-Sized Business Energy Efficiency Program offers zero-interest loans with an on-bill repayment option. Found that loans >$5,000 are more likely to use on-bill financing option and that on-bill financing results in lower arreareages/defaults and increases the "close" rate (ratio of projects signed to proposals offered).
-**Milwaukee Energy Efficiency (Me2)** is developing a "Pay-As-You-Save" (PAYS®)-type financing program for commercial and residential owners. Me2 administers the program and repayment is a "savings charge" under the authority of the City.

The following jurisdictions were unable to successfully establish or maintain on-bill financing systems:
-**NSTAR (the utility serving Eastern Massachusetts)** has so far declined to implement on-bill financing for the Cambridge Energy Alliance because of billing system limitations.
-**Sacramento Municipal Utility District (SMUD)** canceled the on-bill repayment feature of its residential loan program due to lack of compatibility with the utility's new billing system and difficulties establishing a payment hierarchy.

Key Lessons Learned:
- While initial implementation can be challenging, on-bill financing makes loan repayment more convenient for customers and results in a lower default rate on loans.
-With guaranteed energy savings, on-bill financing allows the customer to see a savings on the energy bill while still paying back the loan that covered up-front costs of the upgrades.
-On-bill financing can also attach an energy efficiency loan to the meter, not to the property owner and holds potential for distributing the costs of energy efficiency upgrades across current and future beneficiaries of those investments.

Innovative Repayment Mechanism

Add-on To Property Taxes

POLICY DESCRIPTION
Financing for energy efficiency upgrades could be paid back as a special assessment on the owner's property tax bill. This repayment mechanism ensures that the loan repayment remains with the building, not the property owner.

POLICY OBJECTIVE
To provide immediate savings to customers, simplify loan repayment, and help distribute the cost of upgrades over time with future owners/beneficiaries of those upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★	Cost of Policy Implementation	★★★★
Economic Benefit	★★	Administrative Feasibility	★★★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★

- **Broadly applicable measures and most sectors:** The policy applies equally to all fuels (gas, oil, steam, elec.) and measures within these sectors. Policy does provide a direct financial incentive toward the purchase of the measure, but does not provide any guidance as to which measures should be installed. Non-profits and public institutions that don't pay property tax would not benefit from this policy, although these owners represent a relatively small share of total building ownership.
- **Costs and savings stay with the property:** Attaching the cost/savings of energy efficiency upgrades to the property could provide a significant incentive for owners to make upgrades since the cost could be amortized over a period of many years and shared with future owners/beneficiaries of the upgrades.
- **Limited existing experience:** Given the limited experience of jurisdictions throughout the country with this policy, consumer acceptance of this policy is rated conservatively. Widespread adoption would raise the potential of this option.

ECONOMIC BENEFIT — Rating: ★★

- **Low to Moderate economic potential:** Based on our modeling, this policy ranked in the lower half of economic impacts among all the policies reviewed. Due to lack of existing experience with this policy, it is expected to have a low to moderate economic impact, although widespread uptake of the policy would enhance the economic benefits.
- **Applicable to all sectors:** This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★★

-Less costly than on-bill financing: Adding the cost of upgrades to property taxes would likely be less costly to implement than on-bill financing because the capacity for adding line items to billing and capacity for funds distribution already exist.
-Technology and administration upgrades: $20,000 - $100,000. Costs may be incurred for the integration of loan repayment charges or energy efficiency LID assessments into the existing system for property tax bill add-ons.
-Policy assessment: $20,000 - $50,000. Some further policy assessment would be needed to address applicability (or devise a work-around) for public institutions and non-profits.
-Collection fee: According to the RCW, King County has a right to charge a 1% fee on collection of fees for loading and distributing payments via the property tax system. For LIDs, the Treasury charges the District $4 per account per year for collection and distribution of payments.

Innovative Repayment Mechanism

Add-on To Property Taxes (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★★★

-Implementing financing via property taxes appears to be feasible: Although the method has not been tested for energy efficiency upgrades, the County and the City have the capacity to add a charge to property taxes in a few different ways, depending on the source of capital:

1. **Bill as a line item to property taxes**: King County Treasury currently adds fees onto property tax bills and distributes fees to appropriate divisions. Fee amounts by property must be delivered to the Treasury each year by the administering division, as the County will not track amortization of loans. Payments are distributed as they are received (on a daily basis). Each fee has its own levy code, which identifies what division receives the payment.
2. **Bill via the existing Local Improvement District system**: The City currently maintains a separate billing system for LIDs. Pursuant to the RCW, the County or the City will collect annual payments after District has approved a series of resolutions and provided all information to the Treasury.

-**On-bill financing is very scalable:** On-bill repayment of loans could be used for all loan amounts, targeting all kinds of efficiency upgrades. State law limits utility loans to a ten-year term.
-**May be challenging to implement if participation is low**. Because of the resources necessary to set up a new fee on a property tax bill, there will be resistance to undertaking the effort if participation rates are expected to be low.

STAKEHOLDER IMPACTS

Because the repayment of loans through the property tax system is untested, stakeholder impacts cannot be fully anticipated. Impacts (both positive and negative) that may arise include the following:
-**Building owners** would benefit from the ability to attach loans for energy efficiency improvements to the property rather than to themselves as individuals or companies. This benefit is expected to significantly address a key barrier to making energy efficiency improvements—the perceived inability to recapture their investment upon selling the property. One potentially negative impact is that the loan being repaid would likely be added as a lien placed on their property. Such liens are standard practice in real estate loans, however. Some building owners could potentially have difficulty repaying the loans, but having solid borrower credit standards -- as well as solid standards for energy efficiency project standards that will reduce utility bills -- would prevent owners from taking on more debt than they can feasibly handle.
-**Prospective buyers** and their lenders could be concerned about the presence of a lien on the property that would be primary to the mortgage. They may be required by their lender to pay off the lien at time-of-sale.
-**Lenders** that provide the financing for such a program would be expected to have similar concerns as described under the funding source options. Those impacts are described further under options Private Financing Pool, Revenue or General Oblication Bond Issue, and others.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

No jurisdiction has completely implemented this policy for energy efficiency upgrades.
-Berkeley, California has been pioneering research into the concept, and so far has had very little trouble implementing it in pilot form as part of its proposed Sustainable Energy Financing District. Berkeley will be starting its pilot this fall with between 40 and 60 residential homes and publishing a replication guide in partnership with the University of California, Berkeley, early in 2009.
-Boulder County, Colorado is modeling its proposed Clean Energy Options Local Improvement District off of the Berkeley pilot. If Boulder's LID is approved, all property owners who participate will be responsible for repaying their own individual debts through a special assessment on their properties.
-**Oregon** has drafted a legislative concept to allow local jurisdictions, and possibly the state, to establish energy efficiency investment districts that could involve repayment via the property tax system.

Key Lessons Learned:
- Repayment of energy efficiency loans over long periods via the property tax system holds significant potential for distributing the costs of energy efficiency upgrades across current and future beneficiaries of those investments, significantly lowering a common barrier to upgrades.

Funding Source

Low-Interest Loans

POLICY DESCRIPTION
The City, utilities, or private lenders could offer loans to property owners for pre-approved energy efficiency upgrades. Low interest rates could be guaranteed through volume or by City Light buy-down.

POLICY OBJECTIVE
To provide capital for energy efficiency upgrades at a discounted rate.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★	Cost of Policy Implementation	★★
Economic Benefit	★★	Administrative Feasibility	★★★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★

-Applicable across sectors and to higher cost measures: Financing could be applied to all sectors and is generally most relevant for higher cost measures. The policy by itself does not provide any guidance as to which measures should be installed.
-**Lack of financing has not been a primary barrier:** Lack of financing options has not typically been a major barrier for adopting energy efficient measures, in that making financing available and convenient is not enough to encourage widespread upgrades. Given the recent credit crisis, however, the need for financing may re-emerge. Owners most in need of financing may also have poor credit, which adds risk to this policy.
-**Split incentives for landlord/tenants:** Building owners (particularly commercial owners) who lease their buildings and require tenants to pay the utility bills have less incentive to install measures, as energy savings benefits accrue to tenants rather than owners.
-Uncertainty around savings estimates may be too great to attract private capital: If the City is looking to partner with private entities for these loans, it may be difficult to attract private capital without having a guarantee (from an approved contractor or from the City) backing the savings associated with the energy efficiency upgrades. Investors will likely require this guarantee on loans that may rely (in part) on bill savings for repayment.

ECONOMIC BENEFIT — Rating: ★★

-Low economic potential: Given the issues discussed above, particularly with regard to attracting private capital, the energy efficiency potential and projected economic benefit is low for this policy. Based on our modeling, this policy ranked in the lower half in economic impacts among all the policies reviewed.
-Applicable to all sectors: This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy, as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★

The cost to the City and its partners will depend on a) how much the City subsidizes interest rates, and b) whether the loan program is administered in-house or by bank partners, but is expected to be at least several hundred thousand dollars.
-Policy assessment: $20,000 - $50,000. The City would need to assess strategies for maximizing the effectiveness of a low-interest loan program, educating a contractor/auditor network and addressing the split incentives between investors and energy end-users (e.g., between a landlord and tenant).
-Development of billing and collection process: $20,000 - $100,000. If the City manages the loan program in-house and intends to affix the loan to the property, then a repayment system akin to LID assessment payments can be arranged. Given the City's existing capacity to collect and distribute LID assessment payments, much of this work could be done within existing staffing levels, but some integration costs would be incurred.
-City investment: $100,000 - $1,000,000+. This investment is wholly dependent on how much the City intends to subsidize interest rates.

Funding Source

Low-Interest Loans (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★★★

-**Few technical challenges appear to stand in the way**. There are currently 150+ loan programs for residential energy efficiency in the United States, and the vast majority are managed in-house by utilities. The more challenging part of a low-interest loan program is increasing customer participation through strong contractor/auditor networks that can market the program as a sales tool.
-**City Light is already exploring private sector funding options**: In its *Five-Year Conservation Action Plan,* City Light included plans to consider a privately-financed fund for energy efficiency upgrades (akin to the Clinton Climate Initiative). According to the Plan, this fund would be administered and financed by a private partner.
-**Basic administration could be outsourced or managed in-house**: If the City chose to partner with banks to provide loans, then the burden of administration would be lifted. Both Tacoma Power and Snohomish PUD manage in-house low-interest loan programs.
-**A method is needed to assess creditworthiness of borrowers**: Bill payment history is usually used to assess the creditworthiness of borrowers. If a customer is new to the utility, traditional credit checks can be carried out. Default rates in existing programs are generally very low, around 0.1% – 0.2%, in part due to a utility's ability to threaten power disconnection.
- Security behind loan will be important. To decrease default rates, a secured loan (e.g., a lien on the property) would be preferable to an unsecured loan.

STAKEHOLDER IMPACTS

This policy is expected to have few negative impacts. Some potential impacts are described below:
-**Homeowners:** Homeowners could benefit by lower interest rates and increased access to capital. While most existing energy efficiency loan programs offered by governments have been underutilized and the small interest rate discounts available have not provided a strong incentive, the current credit market could be tight enough that government-sponsored programs could have increasing appeal. If any utility funds are used to secure the loans, however, a lien would be required on the property. Loan administrators report that customers are deterred by such secured loans.
-**Nonresidential building owners:** Commercial building owners could similarly benefit. In the past, businesses have had ready access to financing and capital at favorable rates, but the current credit market could be driving businesses to new options, such as a government-sponsored program.
- **Lenders:** Despite the potential for energy efficiency projects to free up building owner income (thereby increasing their ability to repay the loan), no lenders to date have been willing to collateralize any of these future utility bill savings. Loans would likely be added as liens on the properties, which would help reassure borrowers, but could then raise concerns about borrowers' ability to pay their primary financing obligations (e.g., mortgages).
-Contractors: The availability of low-interest loans could be a useful sales tool for local energy efficiency contractors, who could potentially help their customers secure the financing.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

Many existing low-interest loan programs exist. For example:
-**Tacoma Power** provides zero-interest loans to residential and multifamily residential customers to finance insulation measures and infiltration reduction measures. Approximately 75% of Tacoma's electrically-heated, pre-1988 homes have been retrofitted. The default rate on the loans issued by Tacoma Power has been less than 0.1%.
-**Snohomish PUD** provides loans at 2.9% interest to help its residential customers finance pre-selected energy efficient home improvement projects. The minimum loan amount is $1,000 and the term can be up to 10 years.
-**Midwest Energy** offers free energy audits, recommends improvements and generates an estimated savings level. The customer chooses a contractor to perform the work, and Midwest pays the contractor directly and adds the loan repayment charge to the customer's bill.
-**Sacramento Municipal Utility District** launched a residential loan program in 1977, and since then has issued 135,000 loans, with an average loan size of $8,750. It uses internal funds and charges an interest rate of 7.5%, which covers the cost of capital and all overhead.
-**The City of Chicago** offers a commercial sector low-interest loan program targeting a different industry each year. The City offers a very low interest rate to start (3%) and waives the interest if the business purchases green power.

Key Lessons Learned:
-Beyond providing capital, the most successful loan programs offer technical assistance and "hand-holding" to drive energy efficiency upgrades. This underscores the importance of education and contractor network-building.
- The tight credit market (and related higher interest rates) may drive more interest in low-interest loan programs.

Funding Source

Private Financing Pool

POLICY DESCRIPTION
The City could encourage the development of a pool of private capital assembled by investors to provide a privately-managed loan fund for energy efficiency upgrades. Loan applications and repayment could happen in partnership or independently of the City.

POLICY OBJECTIVE
To provide capital for energy efficiency upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★	Cost of Policy Implementation	★★★
Economic Benefit	★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★

- **Applicable across sectors and to higher cost measures:** Private financing could be applied to all sectors, but is generally most relevant for those higher cost measures that may require financing. The policy by itself does not provide any guidance as to which measures should be installed.
- **Lack of financing has not been a primary barrier:** Lack of financing options has not typically been a major barrier for adopting energy efficiency measures, in that making financing available and convenient is not enough to encourage widespread upgrades. Given the recent credit crisis, however, the need for financing may re-emerge. Those that are in most need of financing also include those with poor credit, which adds risk to this policy.
- **Split incentives for landlord/tenants:** Building owners (particularly commercial owners) who lease their buildings and require tenants to pay the utility bills have less incentive to install measures, as energy savings benefits accrue to tenants rather than owners.
- **Uncertainty around savings estimates may be too great to attract private capital:** The costs and uncertainty associated with accurately measuring energy savings on a project-by-project basis may be too great for private entities to assume the risk on loans that rely on bill savings for repayment.

ECONOMIC BENEFIT — Rating: ★★

- **Low economic potential:** Given that this option will likely have difficulty attracting private capital and that the lack of financing options has not been considered a primary barrier, the energy efficiency potential for this option is low. Based on our modeling, this policy ranked in the lower quarter in economic impacts among all the policies reviewed.
- **Applicable to all sectors:** This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy, as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total estimated cost to City and partners of establishing this policy is $20,000 to $180,000.
-Financing partnership development: $20,000 – 80,000. Whether or not the City participates in the management of the fund, time and resources will have to be spent to engage a financing partner.
-Technology upgrades: $0 – 100,000. If the City manages loan repayment and/or administration, there may be costs incurred in technology upgrades and development.

Funding Source

Private Financing Pool (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★

-**Identifying a lender can be difficult:** Private lenders are hesitant to work across sector lines, though some promising partnerships have been formed that may serve as models in the future. Once an investor has been identified, this program would be relatively straight forward to establish and administer.

-**City Light is exploring private sector funding options:** In its *Five-Year Conservation Action Plan*, City Light included plans to consider a privately-financed fund for energy efficiency upgrades (akin to the Clinton Climate Initiative). According to the Plan, this fund would be administered and financed by a private partner. There is also funding for one staff person, who will focus on private sector financing.

-Basic administration could be outsourced or managed in-house: If the City partners with an investor to provide loans, then the burden of administration will be lifted. However, some oversight involvement from the City will be necessary and the repayment mechanism for the loans may also involve City resources.

-A method is needed to assess creditworthiness of borrowers: Bill payment history is usually used to assess the creditworthiness of borrowers. If a customer is new to the utility, traditional credit checks can be carried out. Default rates in existing programs are generally very low, around 0.1% – 0.2%, in part due to a utility's ability to threaten power disconnection.

-**Savings guarantees from contractors will be necessary:** Private investors will want some guarantee of energy savings, so that energy cost savings will be sufficient to repay the loan. For other jurisdictions, this requirement has led to ESCO partnerships.

STAKEHOLDER IMPACTS

Few negative impacts are anticipated by offering a private financing pool for energy efficiency. Several outstanding questions do remain, however, particularly in the current tight credit market.

-Lenders would have concerns about the credit worthiness of borrowers (both residential and commercial) and would want to use their own borrower assessment practices. Despite the potential for energy efficiency projects to free up building owner income (thereby increasing their ability to repay loans), no lenders to date have been willing to collateralize any of these future utility bill savings. Loans would likely be added as liens on the properties, which would help reassure borrowers, but could then raise concerns about borrowers' ability to pay their primary financing obligations (e.g., mortgages). Nevertheless, real estate loans are common practice, and given active lender participation in qualifying borrowers, credit concerns can likely be addressed.

-Building owners would likely welcome new sources of capital. However, high lender standards may prevent some from qualifying, potentially limiting the effectiveness of this policy.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

Following are leading examples of efforts to bring private capital to energy efficiency upgrades:

-The Energy Efficiency Partnership of Greater Washington D.C. is a recently established partnership between Virginia Tech University, Hannon Armstrong, and Pepco Energy Services. Hannon Armstrong has committed $500 million over five years for retrofitting at no capital cost to building owners and county governments. The company will see a return on its investment over a long-term period via accrued electricity savings. Virginia Tech is the facilitator, and Pepco (and other ESCOs) will provide performance contracting.

-The Clinton Climate Initiative has been working with lenders to offer loans for energy efficiency upgrades, primarily for commercial customers. So far, banks have been unwilling to collaterize any future savings and have instead used traditional financing criteria (e.g., credit). Financing has not been a barrier for many of their early-adopter commercial participants, but credit and financing would be an issue for some fraction of the market. While there is some momentum and interest in creative financing (involving private capital and creating bundled securities), this hasn't yet taken off, particularly given the current credit crisis.

-The Cambridge Energy Alliance was formed two years ago with the intention of accessing a pool of private investors for energy efficiency projects. The Alliance partnered with a local investment bank that specializes in real estate and energy efficiency projects, but an agreement was not reached and the Alliance has not yet been able to identify a financial partner. In the meantime, the Alliance has partnered with ESCOs and local banks to market its services to Cambridge residents.

Key Lessons Learned:

-Finding investors is challenging. Potential investors want to assess an already-packaged portfolio of projects, but identifying projects before a fund exists is difficult. The current credit crunch will likely make potential investors even more scarce.

-If a partnership is established, this option provides a source of capital to the City with a low administrative burden.

Funding Source

Energy Efficiency Mortgages

POLICY DESCRIPTION
Energy Efficiency Mortgages can provide owners additional financing (whether at time-of-sale or with a refinancing) for energy efficiency improvements at discounted interest rates. Energy efficiency upgrades could be chosen that would allow owners to realize a net monthly savings.

POLICY OBJECTIVE
To provide capital for energy efficiency upgrades at a discounted interest rate.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★	Cost of Policy Implementation	★★★★
Economic Benefit	★★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★

- **Applicable across sectors and to higher-cost measures:** Energy efficient mortgages could be applied to all sectors and cover all measures (especially higher-cost ones) within these sectors. Policy would likely provide some guidance as to what measures needed to be installed to get the lower interest rate.
- **Efficiency upgrades lower priority than other building features:** Studies have shown that energy efficiency is generally a lower priority compared to other considerations (location, schools, building design features, amenities, etc.) at the time of purchase.
- **Incentive provided for landlords:** Unlike some of the other policies, the energy efficient mortgage does provide an incentive for landlords to purchase measures as they would benefit directly from lower mortgage interest rates.
- **Potential to integrate into traditional financing methods:** Energy efficient mortgages offer the potential to provide direct incentives for energy efficiency upgrades at time-of-sale.

ECONOMIC BENEFIT — Rating: ★★★

- **Moderate economic potential:** The energy efficiency potential for this option results in a moderate level of expected economic benefits. Based on our modeling, this policy ranked in the middle of the pack in economic impacts among all the policies reviewed.
- **Applicable to all sectors:** This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy, as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★★

- **Partner development: $20,000 – 50,000.** Costs to the City would generally be low because these products would be administered through private lenders, but the City would need to devote some financial resources to assisting with partner recruiting.
- **Technology upgrades: $0 – 100,000.** Depending on the City's role in administration, there may be costs incurred in development of a database to track and verify energy efficiency upgrades in participating properties.

Funding Source

Energy Efficiency Mortgages (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★

-Enticing a partner to offer substantially improved terms or interest rates is expected to be a very significant challenge: Although energy efficient mortgages and refinancing products have been available for many years, the benefits they offer have rarely been substantial enough to attract widespread interest. In order to fulfill the potential of an energy efficient mortgage, the product would need to be widely available and have an interest rate discount of at least an eighth of a point below market rate.

-**Technical and legal challenges appear largely absent**, although lenders would need some means of verifying that energy efficiency upgrades were made or performance attained.

STAKEHOLDER IMPACTS

The offering of energy efficient mortgages is not likely to have negative stakeholder impacts.

- **Building owners** would likely welcome the availability of a product that gave an interest rate discount or other favorable terms for energy efficiency improvements. However, the benefits may not be great enough for the product to rise above other loans available in the market, and local mortgage brokers would need to be educated to pro-actively include such options in their normal searches. Furthermore, if an energy-efficient mortgage required a performance rating or other audit at time-of-sale, both owners and realtors could face extra hurdles (and costs on the order of $300) in the closing process.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

-**Countrywide Home Loans** has had an Energy Efficiency Mortgage product available for several years, but it has not been widely used because a) realtors/lenders are not aware of the product, or b) realtors/lenders are more focused on closing sales and do not want to take the extra time to complete a Home Energy Rating System (HERS) rating and determine necessary upgrades. However, if the HERS rating is done as early as possible during the loan process, it should not delay the close of the sale.

Key Lessons Learned:
-To date, most energy efficiency mortgages have not been popular because they offer only minimal (if any) interest rate discounts and any future savings of energy efficiency upgrades are relatively small compared with the cost of a new home and the perceived added hassle of complying with the energy efficiency mortgage requirements.

-The relevance of this policy would be increased if paired with time-of-sale disclosure or upgrade requirements.

Funding Source

Energy Efficiency Local Improvement District

POLICY DESCRIPTION
Publicly issued assessment revenue bonds, enabled by a local improvement district, to provide low interest and (potentially tax-exempt) assignable financing streams to energy efficiency upgrades.

POLICY OBJECTIVE
To provide capital for energy efficiency upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★	Cost of Policy Implementation	★★★
Economic Benefit	★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★

-**Applicable across sectors and to higher cost measures:** Public financing could be applied to all sectors, but is generally relevant for those higher cost measures that may require financing. CFLs, for example, are a measure that would not benefit from this policy. This policy by itself does not provide any guidance as to which measures should be installed.
-Lack of financing has not been a primary barrier: Lack of financing options has not typically been a major barrier for adopting energy efficient measures, in that making financing available and convenient is not enough to encourage widespread upgrades. Given the recent credit crisis, however, the need for financing may re-emerge.
-Some finance risk with this policy: Those who are in most need of financing also include those with poor credit, which adds risk to this policy. A public financing pool may tolerate more uncertainty than a private entity concerning the measurement of energy savings, which is relevant if energy savings are being used as the means for paying back the loan.
-**Split incentives for landlord/tenants:** Building owners (particularly commercial owners) who lease their buildings and require tenants to pay the utility bills have less incentive to install measures, as energy savings benefits accrue to tenants rather than owners.

ECONOMIC BENEFIT — Rating: ★★

-**Low economic potential:** Given the fact that lack of financing options is not a large barrier for adopting measures, the energy efficiency potential for this option is low. As a result, based on our modeling, this policy ranked in the lower half of economic impacts among all the policies reviewed.
-Applicable to all sectors. This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy, as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to the City and partners of establishing this policy is estimated to be $150,000 to $500,000:
-Legislative development: $50,000 - $200,000. Since an amendment to the RCW is needed in order to make the LID a feasible option, legislative development is estimated to be a significant expense.
-Policy assessment: $50,000 - $200,000. If the City chooses to move forward with LID financing, districts will need to be defined, property owners will need to be educated and recruited and property assessments will have to be carried out.
-Billing and collection set-up: $50,000 - $100,000. The City already has an LID billing/collection processes in place, but some expansion may be necessary to integrate an energy efficiency LID into the existing system.

Funding Source

Energy Efficiency Local Improvement District (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★

-LID financing process is familiar, but can be politically challenging: The City of Seattle has carried out several LID financings. Developing such a district for energy efficiency would be a similar process and would require the participation and cooperation of many different actors in the private and public sector. In a usual LID financing, 60% approval from affected property owners is required. It is assumed that an Energy Efficiency LID would take a "checkerboard" approach, where the district boundaries might be the entire City, but individual property owners would opt-in to participation.

-LID process not yet legal for energy efficiency projects. RCW 35.43.040 details the general authority of a city or town to initiate an LID for a specific list of projects, in which energy efficiency is not included. Thus, the Revised Code of Washington would need to be amended to allow for energy efficiency projects to be LID-financeable. The Energy Efficiency working group of the State Climate Advisory Team is working on enabling language to recommend to the Governor to accomplish this goal.

-Lack of flexibility / Requires property-owner buy-in before financing: The LID process bases financing on assessments of properties before and after improvements. With this structure, property owners need to agree to the upgrades, then wait for financing to go through (instead of being able to just get a loan immediately from a revolving fund). This challenge could be partially addressed by organizing a series of LID financings, with defined opt-in periods, to attract participants.

-Some question about overlap with federal IRS tax credits: Berkeley and San Francisco have both submitted requests for official rulings from the IRS on whether local financing for energy efficiency improvements would overlap with the IRS's Investment Tax Credit (ITC) offerings. Both cities expect the IRS to rule that there is no conflict, but San Francisco is waiting for an official ruling before proceeding.

-City ultimately backs the LID assessment revenue bonds, but the bonds do not use up the City's debt capacity: LID bonds are repaid with assessments that are made by each property included in the District. A guaranty fund is generally also created as a backstop for payment defaults. In the unlikely event that the guaranty fund is not sufficient, the City would have the ability to levy taxes to cover debt service payments.

STAKEHOLDER IMPACTS

The potential stakeholder impacts of an LID policy depend on the approach taken. If an LID is created using a traditional model where fees are assessed on all parcels in the district, then equity concerns (particularly for low-income owners) could be raised when funds from all owners are used to pay for improvements to select buildings. If, on the other hand, an LID is created using a voluntary opt-in approach, few negative impacts are anticipated.

-**Building owners.** Building owners would have voluntary access to financing, which could be a significant benefit in a tight credit market. Owners may object to having a lien placed on their property, but such liens are standard practice in real estate loans. Some building owners could potentially have difficulty repaying the loans, but having solid borrower credit standards -- as well as solid standards for energy efficiency project standards that will reduce utility bills -- would help owners from taking on more debt than they can feasibly handle.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

No jurisdictions yet have an LID in place for energy efficiency projects. The following jurisdictions, however, are actively working out the details of this relatively new application of LIDs:

-Berkeley, CA is beginning a Sustainable Energy Financing District pilot project with 40-60 homes. Loans will be paid back as a 20-year assessment on the property tax bill. Berkeley will be issuing the bonds but will be packaging and re-selling them to a financial partner.

-Boulder County, CO will be voting this November to allow the County to issue bonds for the purpose of providing financing options for renewable energy and energy efficiency improvements via a Clean Energy Options Local Improvement District. The LID would be available to both residential and commercial property owners.

-**Washington's Climate Advisory Team** is exploring the option and is working on language to enable energy efficiency LIDs in Washington.

-**Oregon** has drafted a legislative concept to allow local jurisdictions, and possibly the state, to establish energy efficiency investment districts (EEDs). Assessment bonds - where the repayment stream is collected from the benefiting properties - would be issued.

Key Lessons Learned:

If appropriate amendments can be made to the RCW, LID financing could provide low-cost capital for energy efficiency upgrades and pair naturally with a property tax repayment mechanism. Since the LID repayments are based on assessments to actual properties, property-owner buy-in is needed before financing can occur.

Funding Source

Revenue or General Obligation Bond Sale

POLICY DESCRIPTION
Energy savings could be financed through a (potentially tax-exempt) municipal bond issue. The City would administer a revolving loan fund with the bond proceeds

POLICY OBJECTIVE
To provide capital for energy efficiency upgrades at the lowest cost of capital possible.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★	Cost of Policy Implementation	★★★
Economic Benefit	★★	Administrative Feasibility	★★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★

- Applicable across sectors and to higher cost measures: Public financing could be applied to all sectors, but is generally relevant for those higher cost measures that may require financing. CFLs, for example, are a measure that would not benefit from this policy. This policy by itself does not provide any guidance as to which measures should be installed.
- Lack of financing has not been a primary barrier: Lack of financing options has not typically been a major barrier for adopting energy efficient measures, in that making financing available and convenient is not enough to encourage widespread upgrades. Given the recent credit crisis, however, the need for financing may re-emerge.
- Some finance risk with this policy: Those who are in most need of financing also includes those with poor credit, which adds risk to this policy. A public financing pool may tolerate more uncertainty than a private entity concerning the measurement of energy savings, which is relevant if energy savings are used as the means for paying back the loan.
- Split incentives for landlord/tenants: Building owners (particularly commercial owners) who lease their buildings and require tenants to pay the utility bills have less incentive to install measures, as energy savings benefits accrue to tenants rather than owners.

ECONOMIC BENEFIT — Rating: ★★

-Low economic potential: Given the fact that lack of financing options is not a large barrier for adopting measures, the energy efficiency potential for this option is low. Based on our modeling, this policy ranked in the lower half of economic impacts among all the policies reviewed.
-**Applicable to all sectors:** This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy, as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

Under normal market conditions (pre-September 2008), revenue and general obligation bonds generally carry interest rates of about 5%-6%, with a term of 25-30 years. Debt service is paid with City Light revenues or taxes paid by Seattle residents. Compared to LID financing (the other public financing method considered), revenue bonds may be a simpler and less expensive way to access capital.

The up-front cost to City and partners of enacting this policy is estimated to be $60,000 to $150,000.
-**Policy assessment: $40,000 - $100,000.** Further research would be needed to consider whether the City's internal funds would be a better (less expensive, more flexible) option than bonds.
-Technology upgrades: $20,000 - $50,000. Depending on the repayment mechanism and administrative system chosen by the City, some costs would be incurred for establishing a tracking system to manage the loan fund that results from the revenue bond issue.

Funding Source

Revenue or General Obligation Bond Sale (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★★

-**Few technical or legal challenges appear to exist, as there is an established process to sell bonds.** Bond issues are regularly done by the City of Seattle, and are administratively feasible. The bonds would be special limited obligations of the City, probably included in a larger bond sale, and debt service on the loan fund would be pledged to the payment of the bonds (assuming they were issued on parity with outstanding debt).

-Bond-funded conservation measures would likely be on behalf of the City, not City Light. Since City Light has expended significant effort to include all cost-efficient conservation measures in its *Five-Year Conservation Action Plan* acquisition efforts, supplemental bonds to finance EE measures would likely be on behalf of the City, going above and beyond City Light's plans.

- Revenue bonds require City Council approval and GO bonds require a public vote. Obtaining sufficient buy-in from the City Council or the public may be very challenging.

STAKEHOLDER IMPACTS

This policy does have some potential to raise equity concerns associated with repayment by Seattle taxpayers.

-**City taxpayers**. Issuing bonds would increase the City's annual debt service requirement. In order to cover debt service, the City may have to raise taxes city-wide. All taxpayers would be subject to increased taxes to pay back a loan that may never benefit them.

-**Building owners.** Building owners would have voluntary access to financing, which could be a significant benefit in a tight credit market. Owners may object to having a lien placed on their property, but such liens are standard practice in real estate loans. Some building owners could potentially have difficulty repaying the loans, but having solid borrower credit standards -- as well as solid standards for energy efficiency project standards that will reduce utility bills -- would prevent owners from taking on more debt than they can feasibly handle.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

-Bond financing is the defacto mechanism for municipalities to access capital. Several municipalities have financed portions of their conservation efforts through bond sales.

Key Lessons Learned:

-Bonds are a familiar and low-cost way to access capital for energy efficiency and conservation projects.

- Because the bonds will be backed by the City (or a City department), repayment of the loan may affect Seattle taxpayers or City Light customers.

Mandate - Upgrade

Prescriptive Upgrade Requirements

POLICY DESCRIPTION
Building owners would be required to complete certain energy efficiency upgrades at a pre-defined trigger point (e.g., time-of-sale, date certain, or as a requirement for financing). The policy is similar to (and would likely incorporate) an energy measure checklist. The prescriptive upgrade requirements (the items on the checklist) would be established to achieve a minimum level of cost-effective energy efficiency (roughly comparable to the 20% efficiency target).

POLICY OBJECTIVE
To establish an absolute level of energy efficiency in all targeted building stock by mandating upgrades.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★★	Cost of Policy Implementation	★★★
Economic Benefit	★★★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★★

- Broadly applicable across sectors and measures: Policy applies equally to all fuels (gas, oil, steam, electricity) and measures within these sectors. It also provides guidance as to what measures should be installed.
- Policy required for all property owners: Since this policy is a mandate, it eventually could achieve a high level of technical efficiency potential within the city and realize the significant energy savings attainable through the upgrades on the checklist.

ECONOMIC BENEFIT — Rating: ★★★★

- High economic potential: The high energy efficiency potential for this option results in a very high level of expected economic benefits as most of the technical efficiency potential could be achieved. Based on our modeling, this policy ranked very high in economic impacts among all the policies reviewed.
- Applicable to all sectors: This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to City and partners of establishing this policy is estimated to be $145,000 - $350,000.
-Assessment of required upgrades: $75,000 - $150,000. Although sample checklists from other jurisdictions are available, assessing and establishing what upgrades are needed in each sector to meet city-wide energy efficiency goals, while also assessing the cost-effectiveness of those measures, is likely to be a significant task.
-Development of a database: $20,000-$100,000. A database would be needed to track what properties are in compliance with the mandate. Alternatively, existing databases could potentially be leveraged for cost savings.
-Legislative Development: $50,000 - $100,000. City staff and legal council would need to develop the policy specifics and legislation. Much of this work could be done within existing staffing levels, meaning few to moderate new resources would be needed.

In addition, the challenge of **establishing a compliance mechanism** and conducting on-going enforcement is expected to be a significant cost. Based on the experience of other jurisdictions, the City would likely require at least two full time administrators (one for residential and one for commercial), as well as support staff.

Mandate - Upgrade

Prescriptive Upgrade Requirements (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY — Rating: ★★

- Identifying the required upgrades can pose some difficulty. Residential programs have typically been able to apply a more general set of measures due to more uniform building stock. Commercial programs have had greater difficulties identifying consistent requirements that are easily enforceable, especially for larger buildings with complex and varied heating and cooling systems.
- Compliance mechanisms are needed, but enforcement can be very challenging. Programs have only been successful if there is a way of enforcing the mandates and consequences for non-compliance. Enforcement is particularly challenging for this policy due to the need to conduct spot-check audits, which require a new class of highly-trained workers, and potential complexities associated with checklist-based compliance. For example, enforcement difficulty in commercial buildings led San Francisco to discontinue its commercial prescriptive upgrade requirement. Alternatively, compliance could be tracked through registration of deeds at time-of-sale, involving new costs passed on from the County.
- Quality assurance can be an ongoing concern. In order for an upgrade program to be successful, there must be a workforce of contractors able to perform upgrades at a level that ensures compliance. Some residential programs have found that homeowners who attempt to do the upgrades or hire untrained "handy-men" do not achieve true compliance.
- Legal constraints may exist regarding state residential energy code. State law restricts a city's ability to exceed the State energy code for residences, restricting the potential scope of residential upgrade requirements (per RCW 19.27A). Nevertheless, many older homes are not up to the current code and large gains would still be attainable.

STAKEHOLDER IMPACTS

- Residential homeowners would be affected financially, as the cost of required upgrades could be many thousands of dollars. In the medium term, homeowners would benefit from lower energy bills, but up-front capital would still be required. If upgrades were required at time of sale, the policy could potentially delay a transaction, although some jurisdictions allow for responsibility to be transferred to the buyer. In addition, most residential (single and multi-family) energy ordinance programs have a cost ceiling of between 1% and 3% of the sale price of the home. Homeowners could benefit from higher home sale prices for higher-performing homes as well as from the energy savings of the homes.
- Commercial building owners would be similarly affected. The maximum expenditure for commercial programs is often around 1% of the value of the property, or is limited to improvements that are cost-effective over a pre-defined time period.
- Low-income homeowners could face particular difficulty with the cost of performing upgrades. Other jurisdictions typically include some form of financial or technical assistance or (in time-of-sale requirements) permit the seller to pass on compliance responsibilities to the buyer as part of the sale negotiations. Low-income renters would benefit from lower utility bills associated with upgrades made to rental properties.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

The following jurisdictions have established prescriptive upgrade requirement programs:
- Berkeley, CA established a Residential Energy Conservation Ordinance (RECO) program in 1981 and a Commercial Energy Conservation Ordinance (CECO) in 1994. The City reports that compliance has become a routine part of doing business and between 400 and 500 homes make upgrades as a result of the ordinance each year.
-San Francisco has a RECO policy in place, but its CECO policy is no longer in effect. Building inspectors (who enforced the CECO requirements) found the inspection process very difficult for large buildings with numerous systems.
-**Burlington, VT** passed an ordinance in 1997 to establish a Minimum Rental Housing Energy Efficiency Standards for single and multi-unit rental properties, saving each housing unit an estimated average of $240 per year in electricity costs.

In 2008, the following jurisdictions have been considering implementing or expanding prescriptive upgrade requirements:
-New York City is considering requiring larger buildings (those over 50,000 or 100,000 square feet) to perform an energy audit every 10 years and perform those retrofits that are cost-effective with a 5-year payback period.
-**Austin, TX** is developing an 8-item checklist for residential upgrades. Austin is proposing voluntary targets for the percent of single-family homes sold that receive upgrades -- if these targets are not met, Austin will consider requiring upgrades up to a financial limit of the lesser of: (1) the total cost of performing upgrades with a 7-year pay-back period or (2) one percent of the sales price of the home. Austin is proposing a similar system for multi-family buildings, but with additional mandatory upgrades for "energy hog" properties using 50% more than the average energy use intensity in the City.

Key Lessons Learned:
-Prescriptive upgrade requirements have generally been more effective for single-family homes than for non-residential properties.
-Certification of third-party auditors (and possibly retro-commissioners) is a necessary precondition for required upgrades based on audits.

Mandate - Upgrade

Performance Upgrade Requirements

POLICY DESCRIPTION
Building owners would be required to meet a minimum level of energy performance based on a selected energy rating or labeling system (e.g. 20% better than baseline, ENERGY STAR, or some other rating equivalent to a 20% improvement). Compliance would be enforced at a pre-defined trigger point (e.g., time-of-sale, date-certain, as a requirement for financing).

POLICY OBJECTIVE
To establish an increased level of energy efficiency in all targeted building stock by mandating compliance with a selected performance standard.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★★★	Cost of Policy Implementation	★★★
Economic Benefit	★★★★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★★★

- Broadly applicable across sectors and measures: Policy applies equally to all fuels (gas, oil, steam, electricity) and measures within these sectors. Labels such as ENERGY STAR, and EPS ratings typically provide some guidance as to which specific measures should be installed to achieve an improved rating.
- Policy required for all property owners: Policy would be mandated for all properties and could eventually result in achieving most (if not all) the technical achievable efficiency potential.

ECONOMIC BENEFIT — Rating: ★★★★★

- **High economic potential:** The high energy efficiency potential for this option results in a high level of expected economic benefits. Based on our modeling, this policy ranked near the top in economic impacts among all the policies reviewed.
- **Applicable to all sectors:** This policy is eligible to be implemented in both the residential and commercial sectors. Specific industries that would receive economic benefits would be installation contractors for the various measures (lighting, AC, heating, etc.). The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to City and partners of establishing this policy is estimated to be **$225,000 - $500,000.**
-Assessment of existing rating systems: $75,000 - $200,000. Experience to date has indicated that existing rating systems must be vetted in the marketplace before making mandatory. In addition to selecting a rating system, the City would need to assess and select appropriate performance requirements.
-Development of database: $100,000 - $200,000. A database could be developed to house and provide ability for property owners or City program managers to access the ratings. Alternatively, existing databases (such as the Multiple Listing Service or EPA's Portfolio Manager) could potentially be leveraged for residential and commercial ratings, respectively.
-Legislative Development: $50,000 - $100,000. City staff and legal council would need to develop the policy specifics and legislation. Much of this work could be done within existing staffing levels, meaning few to moderate new resources would be needed.

Mandate - Upgrade

Performance Upgrade Requirements (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY — Rating: ★★

- Potentially easier to develop standards than prescriptive requirements. Performance-based upgrade requirements may be easier to develop (and solicit support for) because they allow for more flexibility and are not measure-specific.
- Compliance mechanisms are needed, but enforcement can be challenging. Programs have only been successful if there is a way of enforcing the mandates and consequences for non-compliance. Enforcement of this policy may not be as dependent on site-visits as a prescriptive (checklist)-based approach due to the ability to track building performance through a regular reporting of a performance score (whether Portfolio Manager, a home energy EPS, or other metric). Still, spot-check audits or other mechanisms requiring new highly-trained workers may still be necessary.
- Legal constraints may exist regarding state residential energy code. State law restricts a city's ability to exceed the State energy code for residences, restricting the potential scope of residential upgrade requirements (per RCW 19.27A). Requiring upgrades at time-of-sale may help address this concern, but further legal review is needed.

STAKEHOLDER IMPACTS

- Residential homeowners would be affected financially, as the cost of attaining the performance standard could be many thousands of dollars. In the medium term, homeowners would benefit from lower energy bills, but up-front capital would still be required. If upgrades were required at time of sale, the policy could potentially delay a transaction, although some jurisdictions allow for the responsibility to be transferred to the buyer. In addition, most residential (single and multi-family) energy ordinance programs have a cost ceiling of between 1% and 3% of the sale price of the home. Homeowners could benefit from higher home sale prices for higher-performing homes as well as from the energy savings of the homes.
-Commercial building owners would be similarly affected, although many measures would likely be cost-effective. Using Portfolio Manager (or other energy performance tools) as a basis for requiring performance upgrades may pose an equity concern due to variation in building stock—even within one class of buildings, e.g. office buildings.
- **Low-income homeowners** could face particular difficulty with the cost of performing upgrades. Other jurisdictions typically include some form of financial or technical assistance . Low-income renters, on the other hand, would benefit from upgrade mandates applied to rental properties.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

The following jurisdictions have been considering implementing performance-based upgrade requirements:
-Portland, OR has been considering a performance-based upgrade requirement for existing commercial and multifamily buildings. The requirement would apply to buildings receiving an ENERGY STAR Portfolio Manager score of less than 30 (on a 100-point scale). Such buildings would have 3 years to improve their score to 30 or demonstrate a 15% improvement in their energy use intensity (EUI). Portland is looking to phase in this requirement, with a policy threshold of 100,000 square feet in 2011 (2% of Portland's existing buildings), 50,000 square feet in 2012 (an additional 3%), and 20,000 square feet in 2013 (an additional 6%). Commercial buildings over 20,000 square feet represent 74% of Portland's commercial building stock. Multi-family buildings over 20,000 square feet represent 65% of Portland's multi-family building stock. Buildings that rate below 30 and do not meet the upgrade requirements would be subject to a financial penalty.
- **Austin, TX** is considering a goal of having 80% of commercial square footage in the City achieve a Portfolio Manager score of 50 or 20% improvement in energy efficiency within 5 years (after an initial 2-year audit period). The provision would exclude properties that have a Portfolio Manager score over 75, certain historic properties, and certain other property types. Austin is considering making these performance-based goals mandatory if the voluntary targets are not met.
-**Berkeley, CA**, after many years using a prescriptive-based Residential Energy Conservation Ordinance (RECO), is moving towards a performance-based approach. The City hopes that a performance-based approach will help even RECO-compliant homes continue to improve.

Key Lessons Learned:
- Performance-based upgrade requirements can allow for greater flexibility in selecting upgrades and therefore potentially greater cost-effectiveness
- Performance-based upgrade requirements are generally considered better suited than prescriptive-based approaches for the non-residential sector.

Financial Incentive

Energy Efficiency Tax Credits

POLICY DESCRIPTION
Owners who complete some designated level of energy efficiency upgrade would be eligible for a tax credit for the "lifetime" of the measure.

POLICY OBJECTIVE
To provide a tangible and significant financial incentive for energy efficiency improvements.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★	Cost of Policy Implementation	★★
Economic Benefit	★★★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★

-Broadly applicable across sectors and measures: Policy could apply to all fuels (gas, oil, steam, electricity) and measures within these sectors. The tax credits could be designed to benefit targeted measures in order to influence installation of particular measures.
-Applicable only to sectors paying taxes: Unless a pass-through program (akin to Oregon's model) was initiated, non-profits and public institutions (e.g. schools and local governments) would not benefit from this policy.
-Addresses the "split incentive" problem: Commercial owners that lease their buildings and have tenants pay the utility bills will have more incentive to adopt measures with this policy relative to some of the other policies being considered.
-Oregon's energy tax credit programs (BETC/RETC) could serve as model: Although Washington does not have a state income tax like Oregon, the BETC and RETC tax credit programs have been very successful in Oregon and could be modified to fit other taxes in place for Washington and/or Seattle. In particular, the BETC pass through program allows non-profits to participate in the program by selling their tax credit to an entity with a tax appetite.

ECONOMIC BENEFIT — Rating: ★★★★

- Moderate to High economic potential: The medium-high energy efficiency potential for this option results in a relatively high level of expected economic benefits. Based on our modeling, this policy ranked in the upper third in economic impacts among all the policies reviewed.
- Applicable to all sectors: This policy could be implemented in both the residential and commercial sectors. Installation contractors for the various efficiency measures (e.g. lighting, AC, heating) would benefit from this policy. The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★

The total cost to City and partners of establishing this policy is estimated to be $270,000 to well over $1 million.
-Policy Assessment: $50,000-$150,000. Extensive work would be needed to establish the specifics of this policy, both in terms of the tax to be credited and the level of credit to offer.
-Technology Upgrades: $20,000 - $50,000. If a tax credit was enacted at the City level, technological upgrades would likely be necessary to track and administer the program.
-Legislative Development: $50,000 - $200,000. City staff and legal council would need to develop the policy specifics and legislation.
- **Forgone revenue for the City: $100,000 - $1,000,000.** A tax credit would likely reduce tax revenues. The degree of reduction would depend on the level of credit offered.

Financial Incentive

Energy Efficiency Tax Credits (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★

- Establishing an energy efficiency tax credit is likely to be a lengthy process. The biggest initial challenge would be identifying what tax to credit. The City portion of the business B&O tax is relatively small (generally about half a percent, although it varies by sector) and is not likely a good candidate. The property tax (or potentially the real estate excise tax) is likely a better target as it is tied directly to the property.

-Reduction in tax revenues or a tax shift may not be possible in this fiscal climate. The tax credit would either reduce available funds for other City programs or potentially result in a property tax shift (i.e. others pay more)—both options could be challenging in this fiscal climate.

- Legal framework is uncertain. Significant legal review would likely be needed to assess options for providing an incentive on the property tax or real estate excise tax.

-Relatively high burden of documentation. The Department of Revenue must be able to verify that a taxpayer was entitled to a tax benefit through documentation provided by the taxpayer; preferably something that the taxpayer has already received (e.g. materials with a required ENERGY STAR rating).

-Compliance mechanisms are needed, but enforcement can be challenging. Some means of ensuring accuracy of the energy efficiency claims would be needed (e.g., conducting random spot-check audits), but the capacity to implement such enforcement could be challenging to develop and could require new, highly trained staff.

STAKEHOLDER IMPACTS

-Commercial and residential building owners could potentially see impacts similar to those associated with disclosure mandates and upgrade mandate policies. At the least, building owners would likely be responsible for the cost of an energy audit to determine the applicability of the tax incentive. Owners of high-performing buildings would benefit by receiving the rebate or incentive payment, but significant costs could be incurred in order to attain an energy efficiency rating worthy of a tax credit.

-Low-income homeowners could be less able to receive the tax credit given their decreased financial ability to perform the upgrades or document their performance through an audit.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

The following jurisdictions have established energy efficiency tax credit programs:

-Montgomery County, Maryland introduced a 'Green Building' Tax Credit for commercial buildings in 2008. The property tax credit applies to buildings that achieve a silver, gold, or platinum LEED-EB (Existing Building) certification. Buildings with a silver rating receive a 10% credit, gold receives a 25% credit, and platinum receives a 50% credit. The credit can only be applied for three years.

-**The State of New Mexico** enacted Sustainable Building tax credits in 2007 for commercial and residential building stock. Commercial buildings must achieve a LEED-EB Silver certification or higher and residential building stock must receive a score of 60 or lower on the HERS index. The tax credit is commensurate with the level of energy efficiency achieved and is attached to the state income tax.

-**The State of Virginia** has amended the state tax code to give authority to local jurisdictions to levy lower taxes on energy efficient buildings (both existing and new buildings). Any building that exceeds the energy efficiency standards prescribed in the Virginia Uniform Statewide Building Code by 30 percent can now be taxed at a lower rate than other real property.

Key Lessons Learned:

-Due to the complexity of taxes and tax credits, implementing an energy efficiency tax credit in Seattle would be challenging.

-Eligibility for tax credit must be widely understood and worthwhile for the taxpayer to pursue from a cost-benefit and administrative perspective.

Financial Incentive

Energy Efficiency Fee-bate

POLICY DESCRIPTION

An energy efficiency fee-bate would charge a fee on all existing buildings. The fee would be waived for all properties in compliance with a minimum energy efficiency requirement (whether performance- or prescriptive-based). Properties exceeding the requirements would instead receive incentive payments as a reward for attaining a high degree of energy efficiency.

POLICY OBJECTIVE

To provide a tangible and significant financial incentive for energy efficiency improvements.

SUMMARY OF CRITERIA RATINGS (★★★★★ = best/most feasible)

Energy Efficiency Potential	★★★★	Cost of Policy Implementation	★★★
Economic Benefit	★★★★	Administrative Feasibility	★★

INDIVIDUAL CRITERIA RATINGS

ENERGY EFFICIENCY POTENTIAL — Rating: ★★★★

-Broadly applicable across sectors and measures: Policy applies equally to all fuels (gas, oil, steam, electricity) and measures within these sectors. Policy does provide a direct financial incentive when requirements are exceeded and a fee when requirements are not met, resulting in a high level of efficiency potential. Policy could potentially be structured to target efficiency upgrades that go beyond current SCL and/or PSE incentive programs.

-**Policy is not technology specific:** A fee-bate policy has the advantage of providing an incentive without favoring one way to reduce emissions over another. Business and individuals can choose to avoid it by reducing usage, increasing efficiency, changing fuels, adopting new technology or any combination of these approaches.

-Could encourage participation in existing programs: The fee-bate policy could encourage participation in existing energy efficiency programs (with historically low participation rates), especially among owners who do not consider energy savings benefits substantial enough to spur them to action.

-**The policy does not necessarily provide guidance as to which specific measures should be installed** Fee-payers are not required to make specific upgrades as a result of the policy, but could surely benefit from an assessment of the highest-potential opportunities.

ECONOMIC BENEFIT — Rating: ★★★★

-High economic potential: The high energy efficiency potential for this option results in a high level of expected economic benefits. Based on our modeling, this policy ranked very high in economic impacts among all the policies reviewed.

-Applicable to all sectors: This policy could be implemented in both the residential and commercial sectors. Installation contractors for the various efficiency measures (e.g. lighting, AC, heating) would benefit from this policy. The general economy would also benefit from increased spending and business output resulting from reduced energy bills. There are little or no manufacturing benefits expected from this policy as all measures are likely manufactured outside the Seattle city limits.

COST OF POLICY IMPLEMENTATION — Rating: ★★★

The total cost to City and partners of establishing this policy is estimated to be $250,000 - $550,000.

-Assessment of existing rating systems and appropriate fee levels: $100,000 - $250,000. Experience to date has indicated that existing rating systems must be vetted in the marketplace before making mandatory. In addition to selecting a rating system, the City would need to assess and select fee levels sufficient to drive behavior change and tied to specific performance benchmarks.

-Development of database: $100,000 - $200,000. A database could be developed to house and provide ability for property owners or City program managers to access the ratings and fee history.

-Legislative Development: $50,000 - $100,000. City staff and legal council would need to develop the policy specifics and legislation. Much of this work could be done within existing staffing levels, meaning few to moderate new resources would be needed.

In addition, establishing a compliance mechanism and technical assistance program is expected to be a significant cost amounted to several hundred thousand dollars annually.

Financial Incentive

Energy Efficiency Fee-bate (continued)

INDIVIDUAL CRITERIA RATINGS (CONTINUED)

ADMINISTRATIVE FEASIBILITY

Rating: ★★

- Establishing a fee-bate is likely to be a lengthy process. City staff would need to first establish a performance rating or label system and then develop an equitable and rational fee structure, along with numerous administrative systems.
- Furthermore, few existing models for existing buildings are available. Most fee-bate models under consideration apply to new buildings (or, in California, new vehicles). Reasonable conduits for charging and rebating the fee on existing buildings include the property tax, the utility bill, or potentially a stand-alone fee mechanism. As with the mandate policies, some trigger point (whether point of sale or date certain) would be needed.
- Compliance mechanisms are needed, but enforcement can be challenging. Some means of ensuring accuracy of the performance rating used in the fee calculation would be needed (e.g., conducting random spot-check audits), but the capacity to implement such enforcement could be challenging to develop and could require new, highly trained staff.
- Potential exists for legal challenges. The City must operate under certain rules about what fees can be charged, and some onlookers could contend that the fee places undue financial burden on them to comply with the City's energy efficiency standard.

STAKEHOLDER IMPACTS

-Commercial and residential building owners could experience impacts similar to the disclosure mandates and upgrade mandate policies. At the least, building owners would likely be responsible for the cost of an energy audit to determine the fee level and would then also be assessed the fee. Owners of high-performing buildings would benefit by receiving the rebate, but significant costs could be needed to attain an energy efficiency rating worthy of a fee waiver or payment.
-Low-income homeowners who are unable to perform upgrades and receive an incentive payment (i.e., rebate) would be further penalized by the fee, raising equity concerns. Some form of exemption would be needed.

ADDITIONAL LESSONS FROM OTHER JURISDICTIONS

No jurisdictions are currently implementing a carbon fee-bate applied to existing buildings. However, the following jurisdictions have implemented or are considering mechanisms with some potential applicability to this policy:
- **Portland, OR** has proposed a Green Building Feebate that would charge higher permit fees for new buildings meeting only the minimum requirements of Oregon's energy code and would waive the fee or provide a cash reward for new buildings meeting higher performance standards. Although the current proposal applies only to new buildings, the City had also considered similar structures for existing commercial buildings, wherein buildings receiving a Portfolio Manager Score of less than 30 would be assesed a fine. Buildings receiving LEED EB certification with Portfolio Manager scores greater than or equal to 69 would be eligible for financial incentives. One of the key challenges Portland experienced in considering an incentive for existing buildings was limitations in Portfolio Manager. Portland was reluctant to base an incentive on a rating system with limited sectoral coverage and challenges with mixed use buildings.
- **British Columbia, Canada** has recently implemented a broad based, revenue neutral carbon-tax. All fossil fuels (including home heating fuels) imported or sold are taxed at the wholesale level ($10 per ton of carbon). All revenue generated by the carbon tax will be returned to individuals and businesses through reductions in other taxes.
- **Boulder, CO** has a carbon tax (not a true fee-bate) on wholesale fuel to fund the city's Climate Action Plan.

Carbon fee-bates are being considered across the country for vehicles. For example:
- **The State of California** proposed a "Clean Car Discount" program, designed to help reduce the state's greenhouse gas emissions by imposing a fee of up to $2,500 on new, high carbon emitting vehicles (starts with 2011 models), and then rebating the fee to buyers of new low emission vehicles.

Key Lessons Learned:
-In theory, an energy efficiency fee-bate offers very significant potential for energy efficiency improvements. With few proven models, however, establishing a carbon fee-bate for existing buildings will require careful study.

Summary Assessment Matrix

10/21/2008

POLICIES	ASSESSMENT CRITERIA			
	Energy Efficiency Potential	**Economic Benefit**	**Cost of Policy Implementation**	**Administrative Feasibility**
FUNDING SOURCES				
Low-interest Loans	★★	★★	★★	★★★★
Private Financing Pool	★★	★★	★★★	★★
Energy Efficient LIDs	★★	★★	★★★	★★
Revenue or General Obligation Bond Sale	★★	★★	★★★	★★★
Energy Efficiency Mortgages	★★★	★★★	★★★★	★★
INNOVATIVE REPAYMENT MECHANISMS				
Add-on to Property Taxes	★★★	★★	★★★★	★★★★
On-Bill Financing	★★	★★	★	★★
OTHER FINANCIAL INCENTIVES				
Energy Efficiency Tax Credits	★★★	★★★★	★★	★★
Energy Efficiency Feebate	★★★★	★★★★	★★★	★★
DISCLOSURE MANDATES				
Building's Historical Energy Use	★	★	★★★	★★★★
Building Energy Performance Checklist	★★★	★★★★	★★★	★★★★
Building Energy Performance Rating/Label	★★★	★★★★	★★★	★★★
UPGRADE MANDATES				
Prescriptive Requirements	★★★★	★★★★	★★★	★★
Performance Requirements	★★★★★	★★★★★	★★★	★★

Appendix E
Sample Energy Star Portfolio Manager Statement of Performance

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Sample Facility

Building ID: 123456
For 12-month Period Ending: October 31, 2005[1]
Date SEP becomes ineligible: February 28, 2006 **Date SEP Generated:** November 10, 2005

Facility Being Labeled
Sample Facility
1234 Main Street
Springfield, VA, 10000

Facility Owner
Sample Owner
4567 Peach Ave.
Springfield, VA 10000
555-555-5555

Primary Contact for this Facility
Jane Smith
7890 Columbia Way
Springfield, VA 10000
555-555-5566
jsmith@jsmith.com

Year Built: 1999
Gross Building Area (ft²): 20,000

Energy Performance Rating [2] (1-100): **80**

Facility Space Use Summary

Space Type	Area (ft²)	Occupants	Operating Hours	Number of PCs
Garage	5,000	2	40	0
Office (General)	15,000	40	40	40

Site Energy Use Summary

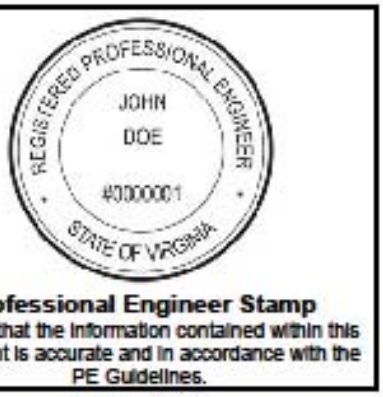
Electricity (kBtu)	123,456
Natural Gas (kBtu)[3]	123,456
Total Energy (kBtu)	**246,912**

Energy Intensity [4]

Site (kBtu/ft²-yr)	6.3
Source (kBtu/ft²-yr)	19.5

Emissions (based on site energy use)

CO_2 (1000lbs/yr)	263



Professional Engineer Stamp
I certify that the information contained within this statement is accurate and in accordance with the PE Guidelines.

Indoor Environment Criteria [5]

Indoor air pollutants controlled?	**Yes**
Adequate ventilation provided?	**Yes**
Thermal conditions met?	**Yes**
Adequate illumination provided?	**Yes**

Professional Engineer
License Number: 0000001
State: VA
John Doe
1234 Vineyard Lane
Springfield, VA 10000
555-555-7788

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
4. Values represent energy intensity, annualized to a 365 day calendar.
5. Based on meeting ASHRAE Standard 62-1999 for indoor air quality, ASHRAE Standard 55-1992 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

EPA United States Environmental Protection Agency

Tracking Number: SEP20060101000001234

Appendix F: Energy Performance Scorecard

ENERGY PERFORMANCE SCORE

Where efficiency and sustainability come home.

Certification #: 000604

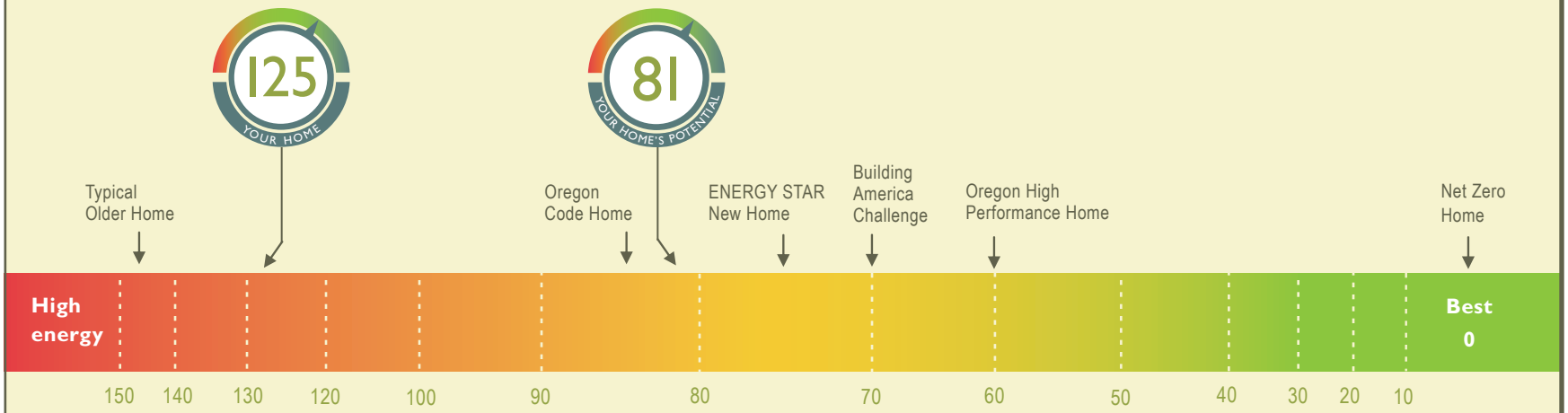
Issue date: June 12, 2008

Address: 000 SW Palatine St. Portland, OR 97292

Type: Single family

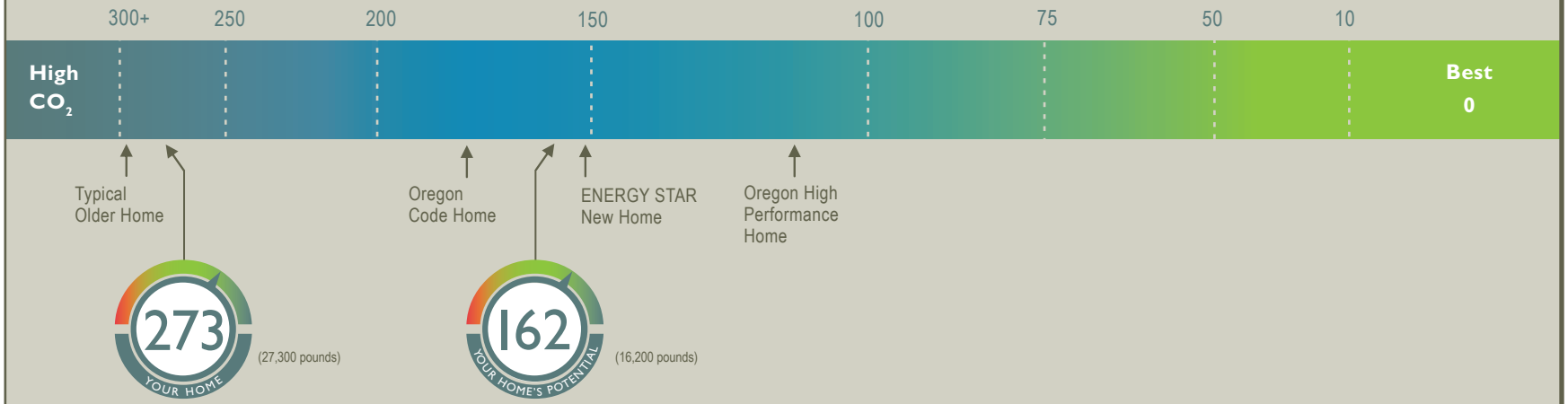
Energy Rating
SCORE

The energy efficiency rating is a measure of the overall efficiency of a home. The lower the rating the more energy-efficient the home and the lower the utility bills will be.



Carbon Footprint
SCORE

The environmental impact rating CO_2x100 is a measure of a home's impact on the environment in terms of carbon dioxide emissions. The lower the rating the less impact it has on the environment.



Rated by Earth Advantage, Inc.
16280 SW Upper Boones Ferry Rd. PDX 97224
Rating conducted June 9, 2008
By Glenn Waer
Visit www.energytrust.org/EPC for tips to maximize savings.

NORTHWEST ENERGY STAR HOMES

earth advantage

EnergyTrust of Oregon, Inc.

Estimated annual energy usage:
Electric (kWh) 7728
Natural gas (Therms) 237

Estimated average monthly energy bill*: $140

*Actual energy use may vary.

Conditioned floor area (sq. ft.): 3,312

Environmental Performance Certificate Report Section

Certification number: xxxxxxxxxxxx
Date issued: xxxxxxxx
Name of inspector: xxxxxxxxx

Summary of this home's energy preformance related features:

The following is an assessment of the key individual elements that have an impact on this home's performance rating. Each element is assessed against the following scale. Very poor/ Poor/ Average/ Good/ Very good.

House Component	Description	Current Performance
Flrs. over unheated space	No or poor insulation with minimal thermal value	Poor
Exterior walls	No insulation	Poor
Attic- flat ceiling	Minimal insulation thermal value	Average
Windows	Single glazed wood or metal frame	Poor
Infiltration	House shell leaky	Average
HVAC ducting	Ducting not sealed and/or no thermal insulation installed	Poor
Heating system	Low efficiency ratings	Average
Water heating	Low efficiency ratings	Average
Lighting	All incandescent	Poor
Current energy efficiency rating		**125**
Current environmental impact rating		**273**

Cost effective measures to improve this home's preformance rating:

The performance rating after improvement listed below are cumulative, that is they assume the improvements have been installed in the order that they appear ion the table.

Lower cost measures	Typical savings	Performance rating after improvements	
		Energy efficiency	Environmental impact
Lighting	$xxx per year	xxx	xxx
Water heating	$xxx per year	xxx	xxx
Infiltration	$xxx per year	xxx	xxx
	Sub-total $ per year		
Higher cost measures			
Furnace replacement	$xxx per year	xxx	xxx
Duct sealing	$xxx per year	xxx	xxx
	Sub-total $ per year		
Potential energy efficiency rating		**81**	
Potential environmental impact rating			**162**

Further measures to achieve even higher standards:

The further measures listed below should be considered in addition to those already specified if aiming for the highest possible standards for this home.

Double glazed windows	$xxx per year	xxx	xxx
Solar water heating	$xxx per year	xxx	xxx
Enhanced energy efficiency rating		**85**	
Enhanced environmental impact rating			**176**

Improvements to the energy efficiency and envionmental impact rating will usually be in step with each other. However, they can sometimes divergy because reducing energy costs are not always accompanied by reduced carbon dioxide emissions.

For advice on how to take action and to find out about offers available to help make your home more energy efficient call 503.968.7164 or visit www.earthadvantage.org

Environmental Preformance Certificate Report Section

Certification number: xxxxxxxxxxx
Date issued: xxxxxxxx
Name of inspector: xxxxxxxxx

Measures to improve this home's performance rating:

Lower cost measures (typically up to $650 each)

These measures are less expensive to install and give you good savings if done correctly and completely. While some of these may be considered as do it yourself (DIY) it is highly recommend that product manufacturers' installation specification be followed and be aware of health and safety risks during the installation. It is recommended that you seek advised from an energy/green consultant before attempting to install these measures.

Measure 1 Lighting:
Probably the easiest measure to accomplish this measure can save up to 25% of your lighting usage by changing existing incandescent out and installing compact fluorescent light bulbs (CFL). Compact fluorescent bulbs come in many shapes and forms that will add as much or more light for a longer period of time and use less energy than the traditional light bulb found in today's' home.

Measure 2 Water Heating:
Although an easy measure to capture energy savings a professional plumber should be involved with the replacement of your older water heater. Purchase a new energy efficient water heater with an Energy Factor (EF) rating of .62 or higher if it is a natural gas model or a .93 EF rating if it is electric. Since water heating can be as much as 25% of your monthly energy bill this is a good measure to accomplish.

Measure 3 Infiltration:
The most effective way for plugging the infiltration holes in the thermal shell of your home is to have a whole house air test (blower door) performed to point out areas of air leakage. An energy auditor can perform this test and you can plug up the gaps which will keep your inside conditioned air from escaping into the outdoors. Store bought caulk or can spray foam will work best depending on how large the opening and where it is located. Always purchase materials with the lowest Volatile Organic Compound (VOC) rating you can find.

Higher cost measures (typically over $650 each)

Measure 4 Furnace replacement:
Upgrading your existing heating system to a higher efficient model can create less energy use and more comfort for you and your family.. Only a qualified heating specialist should install this measure. Consult with an energy auditor as to the cost effectiveness of this upgrade. Sometimes by upgrading the above measures precludes the need for the furnace upgrade.

Measure 5 HVAC Ducting Sealed:
Leaky forced air duct systems can cause ¼ of all your conditioned air, being heated or cooled, to escape outside the thermal shell of our home. Testing can be performed to establish how much leakage exists and whether it will be cost effective to try and seal the whole system. Only trained HVAC ducting installers should attempt to perform this upgrade.

Further measures to achieve an even higher standard.

The further measures listed below should be considered in addition to those already specified if aiming for the highest possible standards for this home.

Measure 6 Double Glazing Windows:
Although the most popular energy upgrade by homeowners it can be also the least cost effective measure to install. However with this in mind there is something to be said for comfort and sound proofing from the outside that will happen by installing thermal efficient windows. There are many types and makes of energy efficient windows available and you should check with an energy consultant for the best solution for your home.

Measure 7 Solar water heating
A thermal panel, usually fixed to the roof, uses the sun to pre-heat the hot water supply. This will significantly reduce the demand on the heating system to provide hot water and hence save fuel and money. These panels are among the most cost effective renewable systems that can be installed on dwellings in urban or rural environments. The Solar Trade Association has up to date information on installers in your area and any grant that may be available.

ENERGY STAR

Remember to look for the ENERGY STAR logo when buying energy efficient products. It's a quick and easy way to identify the most energy efficient product on the market.

For advice on how to take action and to find out about offers available to help make your home more energy efficient call 503.968.7164 or visit www.earthadvantage.org

Environmental Performance Certificate Report Section

Certification number: xxxxxxxxxxxx
Date issued: xxxxxxxx
Name of inspector: xxxxxxxxx

About this energy inspection

Energy inspections are not new and they have been available **in the US since the late 1980s**. This inspection has been undertaken by a qualified inspector who has received appropriate training to collect the correct information about the energy performance of homes. This information has been processed by a Government approved organisation to produce the energy performance certificate and the recommendations for improvements in this report. Both the inspector and the energy performance certificate supplier are regularly monitored to ensure that their work is up to standard.

For clarification of the technical information in this energy performance certificate please contact:
Inspector *on*

About this home's performance ratings

The ratings provide a measure of the overall energy efficiency of this home and its environmental impact. Both are calculated using the Standard Assessment Procedure (SAP), which is the Government's recommended system for assessing the energy performance of dwellings. The ratings take into account the home's insulation, heating systems, hot water system, fixed lighting, ventilation, number of windows and fuels used.

Not all of us use our homes in the same way so to allow one home to be directly compared to another, energy ratings are calculated using 'standard occupancy' assumptions. Standard occupancy is based on a home in a central UK location and assumes that during the heating season the house is heated for 9 hours a day during weekdays and 16 hours a day at weekends, with the living room heated to 21oC and the rest of the house at 18oC.

The ratings are expressed on a scale of 1 to 100. The higher the energy efficiency rating the more energy efficient the home and the higher the environmental impact rating the less impact it has on the environment.

Homes which are more energy efficient use less energy, saving money and helping to protect the environment. The cost of providing lighting, heating and hot water to a home with an energy efficiency rating of 100 would be practically zero. Similarly the carbon dioxide emissions from lighting, heating and hot water for a home with an environmental impact rating of 100 would be practically zero.

The potential ratings shown on page one describe the energy performance of the home assuming all cost effective measures have been installed. For comparison a home built to the 2006 Building Regulations would typically be around the boundary of bands B and C.

This home's impact on the environment

Carbon dioxide is one of the biggest contributors to the man-made greenhouse effect. We all use energy every day – at home, at work and when we travel. To generate that energy, we burn fossil fuels (coal, oil and gas) that produce 'greenhouse' gases – particularly carbon dioxide – which are changing our climate and damaging the environment. The energy we use for heating, lighting and power in our homes produces over a quarter of the UK's carbon dioxide emissions.

The average household in the U.S. creates about six tonnes of carbon dioxide every year. There are simple steps you can take to cut carbon dioxide emissions and help prevent climate change. Making your home more energy efficient by adopting the suggestions in this report can help protect the environment by reducing carbon dioxide emissions. You could reduce your emissions even more by switching to renewable energy sources.

What can I do today?

In addition to the specific measures suggested in this report, don't forget there are many simple measures you can put into action today that will save you money, help reduce your impact on the environment and improve the comfort of your home.

For example:

- Check that your heating system thermostat is not set too high (21oC in the living room is suggested) and use the timer or programmer to ensure you only heat your home when necessary.
- Make sure your hot water is not too hot. Your cylinder thermostat shouldn't need to be set higher than 60oC/140oF.
- Turn off lights when not needed and do not leave appliances on standby. Remember not to leave chargers (e.g. for mobile phones) turned on when you are not using them.
- Buy energy saving recommended appliances. Remember to look for the energy saving recommended logo when buying.

Remember to look for the ENERGY STAR logo when buying energy efficient products. It's a quick and easy way to identify the most energy efficient product on the market.

For advice on how to take action and to find out about offers available to help make your home more energy efficient call 503.968.7164 or visit www.earthadvantage.org

Appendix G: Greenbuilding Taskforce Member Roster

City of Seattle Mayor's Green Building Task Force Membership Roster

New Buildings Committee

Organization	Full Name	Title
AIA Seattle	Lisa Richmond	Executive Director
American Planning Association	Anindita Mitra	Co-Chair, Climate and Sustainability Initiative
Associated General Contractors	Jerry Dinndorf	Seattle District Manager
Beacon Development Group	Paul Purcell	Founder & President
Building Construction Trades Council (BCTC)	Chris Elwell	Executive Secretary
Cascadia Green Building Council	Jason McLennan	CEO
Colliers International	John Powers	Senior Managing Director
Dunn+Hobbs	Liz Dunn	Principal
EDAW Seattle	Sandy Fischer	Director of Design and Planning
Foster Pepper, PLLC	Susan Drummond	Attorney
Futurewise	Mary McCumber	Board Member
International Sustainability Institute	Patricia Chase	Executive Director
King County Green Building Program	Patti Southard	Project Manager
Master Builders Assocation / Built Green	Aaron Adelstein	Executive Director Built Green
Mithun	Bert Gregory	President & CEO
National Association of Industrial and Office Properties (NAIOP)	Kari-Lynn Frank	Director of Government Affairs
NW Energy Coalition	Carrie Dolwick	Policy Associate
NBBJ	Duane Jonlin	Senior Associate
New Buildings Institute	Mark Frankel	Technical Director
Pryde-Johnson	Curt Pryde	Principal
Puget Sound Energy	Bob Stolarski	Director, Customer Energy Management
Stantec Consulting	Tom Marseille	Managing Principal
The Schuster Group	Mark Schuster	CEO & Founder
Touchstone Corporation	Douglas Howe	President
Triad Development	Marco Lowe	Community Development Manager
Urban Land Institute - Seattle	Kelly Mann	Executive Director
US General Services Administration	Don Horn	Director, Sustainable Design

City of Seattle Mayor's Green Building Task Force Membership Roster

Existing Buildings Committee

Organization	Full Name	Title
American Society of Home Inspectors	Joanne MacKintosh	Western Washington Chapter President
~~A~~tmosphere IEM, Inc.	Scott Finley	President
Building Owners and Managers Association (BOMA) Seattle-King County	Rod Kauffman	President
Energy, Environment, and Sustainability	Arun Jhaveri	Certified Sustainable Development Professional
Northwest Energy Coalition	Kim Drury	Energy Consultant
Greenworks Realty	Aaron Fairchild	Managing Partner
Historic Seattle	Kathleen Brooker	Executive Director
Homestreet Bank	Richard Bendix	SVP / Director of Marketing
Jones Lang LaSalle Americas Inc.	Pedro Vasquez	VP, Regional Director
Keithly Barber Associates, Inc.	Kent Barber	Principal
Kennedy Associates	Christian Gunter	Assistant Vice President, Responsible Investing
King County Executive's Office	Jim Lopez	Deputy Chief of Staff
King County Department of Natural Resources	Beth Humphreys	Project/Program Manager
McKinstry	Ash Awad	VP Energy Services
Northwest Energy Efficiency Council	Stan Price	Executive Director
Pacific NW Council of Carpenters	John Littel	Political Director
Puget Sound Energy	Cal Shirley	Vice President, Energy Efficiency Services
Putnam Price Group, Inc.	Cynthia Putnam	Principal
Seattle Housing Authority	Tom Tierney	Executive Director
Seattle King-County Association of Realtors, Coldwell Banker Bain, Assoc., JMR Consulting	Jolene Anderson	Member, Realtor
Seattle Steam	Stan Gent	President & CEO
ShoreBank Enterprise Cascadia	Rachel Brombaugh	Business Lender
Sound Alliance	Dusty Hoerler	Co-chair, Sustainable Jobs & Environment Reasearch Action
Tenant's Union of Washington State	Karen Lesley-Lloyd	Executive Director
University Mechanical Contractors	Richard Happel	General Manager, Energy Service Group
WA Land Title Association	Chuck Trafton	Vice President
Washington Oil Marketers Association, Genessee Fuel & Heating	Steve Clark	Board Member, President